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Annals of Otology, Rhinology and Laryngology

FOUNDED BY JAMES PLEASANT PARKER
INCORPORATING
THE INDEX OF OTOLARYNGOLOGY

VOL. XXVIII, 1918

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ANNALS
OF
OTOLOGY, RHINOLOGY
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INCORPORATING THE INDEX OF OTOLARYNGOLOGY.

VOL. XXVII.

MARCH, 1918.

No. 1.

I.

THE ANNALS OF OTOLOGY, RHINOLOGY AND
LARYNGOLOGY,

INCORPORATING THE

INDEX OF OTOLARYNGOLOGY,

BY

HANAU W. LOEB, M. D.,

ST. LOUIS.

With this number, the consolidation of the ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY and the INDEX OF OTOLARYNGOLOGY is effected. The union of these two journals has been undertaken in order to combine within the compass of one journal the activities for which both were recognized and to permit the enlargement of its scope as the development of otolaryngology may demand.

Four leading departments will be maintained: 1. Original Articles; 2. Abstracts of Current Literature; 3. Reports of Society Proceedings; 4. Index of Current Literature.

It is the purpose of the Editorial Board to make these departments as complete in every detail as possible.

Each number, which will appear quarterly, will contain from 400 to 450 pages.

The ANNALS OF OPHTHALMOLOGY AND OTOTOLOGY was founded in 1892 by Dr. James Pleasant Parker, who continued in the active editorial management until his death in 1896. It was his devotion and untiring energy that brought the establishment of the journal to a successful issue and assured its future development and position.

In response to the diverging spheres of Ophthalmology and Otolaryngology, the journal was divided in 1897, and the two journals, the ANNALS OF OPHTHALMOLOGY and the ANNALS OF OTOTOLOGY, RHINOLOGY AND LARYNGOLOGY were established.

Dr. T. Melville Hardie became editor of the ANNALS OF OTOTOLOGY, RHINOLOGY AND LARYNGOLOGY, and continued in this capacity until 1898, when the editorial management was assumed by Dr. Hanau W. Loeb, who is the present incumbent.

The INDEX OF OTOLARYNGOLOGY was founded in 1913 by Dr. Joseph C. Beck, who has continued in its active management up to the present time.

The primary object which prompted the establishment of this journal was to bring the entire literature of Otolaryngology, including its borderlines, before the profession so as to make it available for reference and study. The feeling that this could be greatly extended in the merged journals is responsible for the combination.

II.

THE SURGERY OF THE TONGUE.*

BY JOSEPH C. BECK, M. D.,

CHICAGO.

In describing diseases of the tongue, particularly from the surgical aspect, the subject is divided anatomically into:

- A. Surface of the tongue,
- B. Substance of the tongue,
- C. Base of the tongue,
- D. Areas contiguous to the tongue.

While my purpose is to discuss the surgical portion of the symposium, it will be impossible not to mention at least some of the nonsurgical conditions and record three in particular which have thus far received little or no attention. I refer especially to

- 1. Chronic focal infection of the tongue.
- 2. X-ray burns of the tongue.
- 3. The tongue in acute lymphatic leukemia.

The more detailed description and management of these will be given in the case reports from my practice.

The tongue, belonging to the mouth or oral cavity, is subject to many local diseases as well as to manifestations of general diseases. It is easy to understand how infection may result in view of the fact that lies in this hotbed of pathogenic microorganisms. Traumatism also occurs with great readiness.

The redeeming feature is the great healing power that is present in the oral cavity, due probably to the rich supply of blood and great formation of antibodies. Perhaps there is a natural acquired immunity present. This is only in cases of healthy individuals, because in the old or very young, as well as in anyone suffering from a chronic constitutional disease, the slightest infection about the tongue will be followed by

*Read before the Section of Laryngology, Otology and Rhinology at the sixty-eighth annual session of the American Medical Association, New York, June, 1917.

severe lesions. The teeth are probably more than any other structure in the neighborhood of the tongue the actual or predisposing cause of its disease. With respect to this lack or improper attention to these, until a recent date, is appalling.

Kronenberg found that in the earliest childhood only one-third of a large number of patients examined had good teeth, and this proportion became less with the increase of age. In other words, the older the individual, the worse the teeth. Kronenberg holds the members of the dental profession responsible, claiming that they are absolutely unqualified, owing to their lack of knowledge of pathology and surgical principles, to take care of the mouth in the human race, and that this applies equally to their attempt to look after the rest of the oral cavity, including the tongue.

TRAUMA OF TONGUE.

Biting the tongue occurs accidentally during a fall on the chin or during the act of chewing, as well as during an epileptic attack; it is usually of no consequence unless secondarily infected.

Ulcers of the side of the tongue due to jagged edges of carious teeth are most of the time superficial and heal promptly following attention to the teeth, but at times they are deep and infiltrated, with secondary enlargements of glands of the neck. The specific treatment for these ulcers is the application of a ten per cent iodoform paste. If the ulcer does not heal by the aid of this simple treatment, and if the border is somewhat infiltrated, an immediate excision of a part of the tissue should be made and followed by microscopic examination, because it is well known that such ulcers are apt to develop into carcinoma. One of the most pernicious treatments of these ulcers is the employment of nitrate of silver, which delays the carcinoma to be absent and the ulcer persists after the simple proper diagnosis and treatment. If the examination shows treatment, it should be thoroughly curetted. Tuberculosis or rather lupus has been observed following injury to these ulcers.

Punctured wounds from forks, toothpicks or by the dentist during the process of treating the teeth, are responsible for a

fair number of traumatic conditions of the tongue, and these do not heal as readily as one would expect.

During the brushing of the teeth a bristle may lodge in the tongue and be followed by an infection, likewise a fish bone may become lodged, especially in the region of the circumvalate glands, and if not removed may lead to abscesses.

Decubital ulceration of the margins of the tongue from the teeth occurs in cases where the tongue appears to be larger than the space provided for it in the mouth, or from deformed teeth, especially when they are placed inwards. This also applies to bridges, artificial plates or orthodontia apparatus. Ulceration of the frenum of the tongue in the sucking child or during whooping cough, is a more frequent occurrence than is usually supposed. The simplest mild astringent treatment cures these conditions when the cause is removed. In the sucking child it is due to the frenum of the tongue coming in contact with the alveolar margin of the lower jaw and being allowed to remain there too long. In the adult these abrasions of the frenum linguæ have been seen following the forced pulling of the tongue in making a prolonged and forcible indirect laryngeal examination.

Other forms of trauma of the tongue are the burns, scalding and cauterizations. Eating very hot food will at times lead to superficial scalding of the tongue, and the blisters are usually not seen, since they burst very early and leave a white deposit. The papillæ are always prominent and the condition is very painful. In children the accident may occur as the result of placing the mouth to the steam escaping from a tea kettle; it often leads to severe scalding of the oral cavity, including the tongue. Too vigorous cleaning of the surface of the tongue, especially in infants, may lead to traumatic lesions. The pain is the most important symptom to combat, since people would rather not eat than suffer. The use of alypin, fifteen per cent solution, cocain and antipyrin solution, three to five per cent, or powdered anesthesin will suffice to anesthetize the surface so that the patient may eat without much pain. Some of the more severe burns occur in consequence of taking some concentrated acid or alkali either by mistake or intentionally in the attempt of suicide. As a rule there is a white appear-

ance of the surface of the tongue, but it depends somewhat on what substance was taken. For instance, the surface is brownish where chromic acid has been used. I have recently seen a burn of the tongue the like of which, so far as I know, has not been reported in literature. The condition which resulted from massive doses of radium will be described in detail in the case reports. The treatment of these severe burns of the tongue is of course usually overshadowed by the coincident necessary attention to the burns of the pharynx, esophagus or stomach. However, the immediate flushing of the oral cavity with great quantities of water, either acidulated or alkaline, depending on what was taken will be of service. After the surface ulcerates, the treatment is the same as any other simple ulcer.

Parasites in the tongue are infrequent, but trichina and echinococcus may be found.

Hemorrhages in and from the tongue are also comparatively rare, most of the bleeding from the mouth coming from the gums and teeth. However in scurvy and other blood dyscrasias, bleeding from the tongue or hematoma may be observed.

SKIN LESIONS.

In connection with urticaria there occurs frequently a swelling of the tongue that at times is enormous in size. It has been spoken of as an angioneurotic or an anaphylactic reaction. I had such a case under my observation in which the larynx was also implicated and in which a fatal termination resulted from suffocation. (I shall describe this case in detail in my case reports, especially as to the dietary experiments.) While other parts of the mouth, pharynx and larynx may have simultaneous erythematous eruptions with those appearing on the skin as erythema nodosum, erythema exudativum, erythema multiforme, erythema bullosum, lupus erythematosus, such manifestations do not appear to occur on the tongue.

Recurrent herpes, however, forms on the tongue in connection with that of the skin, and, according to Seifert, it is the forerunner of a pemphigus, although Fournier believes they are an evidence of the so-called spontaneously cured lues. This form of herpes is constantly recurring and does not leave

any marked changes behind. Quite different is the form of herpes from infection in the intestine and the manifestation of toxins.

Herpes zoster has been found in the pharynx in close proximity to the base of the tongue, following the palatopharyngeal branch of the fifth nerve. De Havill and Hall has also found it along the branches of the vagus.

Pemphigus has not been observed on the tongue, but other parts of the mouth and pharynx are at times the seat of that trouble.

Leucoplakia has been spoken of as a psoriasis, because there have been a few cases found in which this whitish formation in the mouth was associated with psoriasis. These are, however, really two distinct conditions. Leokoplakia is a keratitic change of the epithelium. There are light forms and very severe ones. In the latter crevices or fissures may form, which bleed and are painful. These must be looked on as precancerous states. A leukoplakial area may exist for years, when suddenly it will develop rapidly into a cancer. Since the cause is not known, the treatment is also difficult. Some think it is syphilitic or that it develops upon a healed out syphilitic ulcer and consequently treat it by antiluetic measures. Seifert believes it is due to the use of the mercury in the treatment of the syphilis. Those who think it is due to the irritative action of tobacco, etc., have not enough evidence to support their theory. Surely antiluetic treatment is of little benefit. The best that can be done for this condition is to keep the mouth alkaline by washes, proper diet and attention to the gastrointestinal tract. The use of Mandel's solution, lactic acid or chromic acid, five per cent, has been advised. Then if there is any infiltration, a part of the tongue should be resected to prevent the development of a cancer. When there are fissures or ulcers as well as marked hypertrophies, it is better to remove this tissue thoroughly with either a Paquelin or galvanic cautery either under local or general anesthesia. It may be done in several sittings. Radium and X-rays are also being used.

SURFACE OF TONGUE.

A certain hornification can be normal, but when it is marked it is spoken of as hyperkeratosis linguæ.

A certain segment formation of the tongue may be normal, whereas when it is of a greater degree it is pathologic and is known as *lingua desiccata* or *lingua plicata*, according to Grünwald and Seifert; the scrotal tongue, according to Semon, and *langue scrotale*, according to Chambardel. This congenital deformity causes no real trouble; it is purely psychic on the individual that has one. It is said that catarrhal inflammation occurs more readily on such tongues, owing to the retention of material within these cavities.

Another similar condition, however pathologic, is the so-called map tongue, *lingua geographica*, etc. Usually found in children, Ruttin says it is seldom found in people older than six years. Czerny says it is a manifestation of the constitutional disease of exudative diathesis (*scrofula*). The characteristic picture is a plaque formation of a round or oval shape and different sizes, often slightly elevated and surrounded by a whitish border. The one peculiarity is that these spots come and go. It causes little trouble and is only of diagnostic value.

Papillitis linguæ, according to Duplaix and Seifert, is a condition in which one observes, usually at the tip of the tongue, raised red punctate spots corresponding to the papillæ, which are very painful when acid or sharp substances come in contact with them. The treatment comprehends the repeated use of the actual cautery and applications of local anesthesia.

Glossitis superficialis chronica, according to Moeller, presents a spotted formation on the tongue which also spreads from one place to another as in the *lingua geographica*, only here the spots are redder and irregular in shape. The papillæ are also swollen and thereby present small superficial ulcers which are painful, and consequently eating is distressing. This condition is mostly found in poorly nourished, anemic women. A bland diet should be prescribed, a local anesthetic usually before eating, and mild astringents. Preuss recommends a decoction of blackberries applied to the tongue as extremely gratifying.

Papillitis atrophicans lateralis, according to Wagner, results in ulceration of the tongue, surrounded by marked swelling. The ulcer appears to be due to atrophy. Excision of this painful ulcer ends the trouble.

Glossitis papulosa acuta, according to Michelson, is a condition in which a large number of elevations the size of a pin point form, and soon enlarge to the size of a penny. Fever and considerable pain are usually present. This condition disappears in a few days under mild antiseptic treatment.

Linguae nigritis villosa, or black haired tongue, is a condition not infrequently found; usually in the center near the base a peculiar brownish black mass appears. The length of this so-called hair (hyperkeratosis) varies from 1 to 1.5 centimeters. A great deal has been written about the probable cause as well as the color of this growth. Some of the authors are Raymond, Dessois, Lannois, Roth, Davis, Schmiegelow, Sendziak, Weill, Guegneu, Schech, Hoenisch, Girandeau, Goodale, Nakamura, Blegvad, Chevalier and myself. The color is supposed to be due to foodstuffs stain. The reaction of the saliva being acid in most instances, it is thought that that is the great predisposing cause. Smoking is also given by many as a possible cause. Most of the cases have recurred in women.

Hornification of the dorsum of the tongue is described by Kronenberg in a man 70 years old who smoked a pipe incessantly. This man developed a cancer of the tongue.

SUBSTANCE OF THE TONGUE.

Glossitis Parenchymatosa et Abscedens.—A phlegmonous condition results from a trauma, from fissures and ulcers, associated with typhoid fever, from wasp and other insect stings. This condition at times appears very formidable, so that incision may become necessary. Such local infections may lead to a general infection or a true phlegmon of the whole oral cavity (Ludwig's angina). When the tongue becomes the seat of abscesses, it may appear as an acute diffuse type, but more frequently is a circumscribed abscess of the dorsum of the tongue. This feels at first like a little marble and may last for weeks, with but little pain and feeling of tension. It soon begins to fluctuate and resembles a cyst. It should not be mistaken for a gumma or vice versa. Both gummas and cysts are usually painless. These abscesses heal usually very rapidly after an incision, and these should always be made parallel to the course of the tongue.

Chronic Granulomatous Diseases.—Tuberculosis is comparatively rare, considering how a tuberculosis of the epiglottis, etc., will ulcerate to the very bottom, and yet the tongue remain untouched. There are cases, especially in the much debilitated, in which this disease takes hold on the tongue, and in such cases it is of a miliary type. It is usually spread through blood and lymphatic circulation from a general tuberculosis. Primary tuberculosis of the tongue is reported by Senator and Weber, and they have found the bovine type of microorganisms. Glass saw a case of tuberculosis of the tongue follow the extraction of a tooth. It is nevertheless surprising how rarely the tongue—for that matter, the entire oral cavity—is infected with tuberculosis, when we consider that a tuberculous individual constantly expectorates sputum laden with tubercle bacilli. Aside from the miliary form there occurs the tuberculous infiltrate and ulceration of the tongue. These are likely to be mistaken for syphilis or a cancer, and the usual differential diagnosis by iodid or mercury treatment, with microscopic examination, will suffice. Some of these tuberculous ulcerations spread and become more numerous. They are usually surrounded with an area of induration and the surface has a tenacious secretion. In such instances there is much suffering, and the patient will rather not eat than endure the pain caused by taking food. There are forms of infiltrates of tuberculosis of the tongue that assume quite a size and have no particular tendency to ulcerate. These are spoken of as tuberculoma.

In the previously mentioned deep fissured tongue there are cases of tuberculosis, and only when spreading these folded areas apart can a sort of radiating of tracts between the muscular substance of the tongue be observed. The differential diagnosis of tubercular lues and cancer of the tongue is not always possible without calling to our aid all the various laboratory and therapeutic methods. Tuberculosis of the tongue when ulcerated is best treated by surgical methods, as excision and curettements or actual cautery give the best results. The employment of the Roentgen ray, radium, sunlight and other forms of ray therapy has not given as satisfactory results as surgery, and should only be used when the latter is not applicable, as for instance at the base of the tongue,

where only cautery, curettement and the various forms of ray treatment may do so much good.

Lupus.—In two thousand cases of all forms of lupus at the Finsen institution, Strandberg found fifteen cases of the tongue. It occurs in the form of multiple elevations which become confluent at times and seldom ulcerate. The course is like lupus anywhere else, such as periods of remission, with areas healing spontaneously while others are developing side by side. There is comparatively little trouble from these infiltrated areas, which may last for years, when suddenly the process breaks out into a general miliary tuberculosis. The treatment is surgical in the resection, curettage and the actual cautery. Recurrences are very common.

Syphilis of the tongue occurs in all ages, as (a) primary and chancre, (b) secondary or papule, and (c) tertiary or gumma.

As stated in the considerations of tuberculosis of the tongue, it is the differential diagnosis that is the all important part, since the treatment is rarely surgical and since the condition always responds to the antisppecific medication.

Again, we must bear in mind that a tuberculosis and lues of the tongue may coexist, as can lues and carcinoma. When an ulcerated syphilitic tongue or, for that matter, any form of destructive process, heals out, there results a scar that may require surgical intervention. There is one form of secondary scar formation of the tongue following marked ulceration of the surface of the tongue, which is known as chronic interstitial glossitis, and is also known as the tongue sclerosis or shriveled tongue.

In such tongues we often find crevices with secondary infections and small nonsyphilitic ulcers.

Actinomycosis involves the tongue next to the lower jaw, the most frequently in the oral cavity. The type of lesion is a circumscribed hard node. Diagnosis is made by puncturing and finding the actinomyces. Cases of actinomycotic abscess of the tongue occur, according to Kümmel, not at all infrequently, and give the same distressing symptoms of dysphagia and difficulty in speaking as tongue phlegmon. He has also seen cases of actinomycosis simulating Ludwig's angina. The treatment of actinomycosis of the tongue is to make wide

and deep incision, since the process is invariably located in the depths of the tongue. Internal administration of large doses of iodid, X-ray and radium have been used with considerable success.

TUMORS OF THE TONGUE.

(a) *Produzione sotto lingulate*, of the Italians, is a tumor-like mass of the *frenum linguæ* in the nurslings. Bernheim-Karrer has examined these small growths microscopically and found them to correspond to a chronic granuloma. Treatment is excision.

(b) Fibroma of the tongue is not infrequent; a number of these have been found to be congenital. These exist for a long time without any symptoms. They are distinctly circumscribed and may occur on any part of the tongue. In some rare instances these growths have a pedicle. The *fibroma pendulum* are at times mixed with sarcoma. Histologically it is often very difficult to differentiate between sarcoma, fibroma, and gumma before softening. These fibromata are usually easily shelled out of the tongue, and if this is not easily accomplished operation should be deferred until a microscopic examination is made.

(c) Lipoma of the tongue is a round, soft, and oftentimes semifluctuating tumor. Abscesses and cysts may be mistaken for it. The treatment is strictly surgical and the lesions may easily be peeled out of the tongue substance. The growth is perfectly harmless and requires operation only when very large, causing difficulty in swallowing and breathing and speaking. At times it may get into the way of the teeth and the patient bites into the tumor mass.

(d) Myoma of the tongue usually occurs at the base, but Brooks and Stebbins found a rhabdomyoma on the dorsum of the tongue and Casezza a leiomyoma near the tip.

(e) Osteoma.

(f) Chondroma and other mixed tumors of the tongue have usually been diagnosed only after operation and microscopic examination.

(g) Chloroma of the tongue which, however, was found by Sternberg and was diagnosed as a lymphosarcoma before operation.

(h) Amyloid tumors of the tongue are usually found at the base.

(i) Papilloma of the tongue is usually associated with papilloma elsewhere in the oral and pharyngeal cavity. The peculiarity of papilloma of the tongue is that it is always solitary, in contradistinction to the multiple papillomata of the larynx or the skin. It is also noteworthy that it does not recur as frequently when once removed. If it does recur, according to Simpson, it is well to be on the lookout for sarcoma or carcinoma. The treatment is surgical; a snare or curette has proved the most satisfactory instrument.

(j) Angioma of the tongue as well as other vascular tumors has the characteristic color of venous distentions. It is usually multiple and congenital, and remains unchanged for years, when without any warning it may grow rapidly.

In children angiomata may sometimes be large; they are described by Hallopeau as *nævus enorme*; when they spread all over the one or both sides of the oral cavity they are known as *cavernomata*. Serious symptoms occur at times, especially in children, such as bleeding and choking.

(k) Telangiectatic granuloma or botryomykosis of the tongue, according to Koujetzny, is an easily bleeding tumor mass, looking much like a raspberry, situated at the base, having a long pedicle. When removed, it rapidly recurs unless a part of the healthy tongue is taken away at the same time.

(l) Lymphangioma of the tongue may occur as solitary or diffuse masses known as *macroglossus lymphatici*. The tumor mass is subject to inflammation and swelling, but it recedes again in due time.

(m) Lymphatic cysts of the tongue have been described by Kümmel, Rosenack and Feldmann. The *macroglossia* or lymph vessel tumor of the tongue is characterized by unilateral or bilateral swelling which has periods of exacerbation due to inflammation. The more repeated the attacks, the less likelihood there is of the tongue going back to its original size.

All the vascular tumors are best treated by cautery, either Paquelin, actual or electric; at times ligation of vessels is necessary preceding the cautery or excision. I have employed the surgical diathermia as well as radium in cases of angioma

and lymphangioma with considerable success. In the case of macroglossia excision of a part of the tongue may become necessary when the tumor assumes great proportions and threatens to choke a patient.

(n) Endothelioma of the tongue was observed by Kümmel, but he designated it as a cylindroma.

BASE OF TONGUE.

On account of the location of the lymphoid tissue in this area (the lingual tonsil), we have the greater surgical difficulties from diseases of that structure. However, there are conditions entirely independent of this lymphoid mass.

The degree of hypertrophy of the lingual tonsil varies, but when it is marked the epiglottis may be pushed up and back. Dilated veins are usually found between follicles. At times the hypertrophy on one side or the other may be near the anterior pillar. The various changes in the lingual tonsil are to be considered pathologic only when they produce symptoms, and only then is surgical intervention required. Many of the symptoms have been considered as nervous manifestations because they are indefinite; usually, however, there is a sensation as of a foreign body which these patients constantly attempt to remove by hacking, rasping, etc. They often complain of pain at the base of the tongue. Both these sensations disappear, usually after eating, for a time. Small hemorrhages may arise from the dilated veins, usually in the morning. Many true neurotic symptoms, on the other hand, occur as a result of hypertrophy of the lingual tonsil, especially if acute inflammatory attacks develop in it. Such symptoms as dysphagia, voice fatigue and even change in the voice are not uncommon. It is my opinion that not enough attention is given to this organ as a source of disease; it is surprising how easily patients are permanently relieved of these vague symptoms by proper attention to a hypertrophied lingual tonsil. A good test of the hypersensitiveness of the lingual tonsils when it causes these symptoms is the application of alypin, ten per cent solution, by which they will be much lessened or relieved.

The treatment required comprises local applications of silver and iodine, chemical or electric cautery and operation. Chromic

acid, trichloroacetic acid, nitrate of silver in pure form are the best chemical substances to destroy the lymphoid follicles.

The operations are performed by guillotine, scissors, curettes, and biting forceps, of which there are many varieties, but of essential importance is the thorough removal with the least amount of traumatism. Actual cautery is especially applicable in the cases where the veins are much in evidence. Care must be exercised not to touch the epiglottis; it is well to push it out of the way.

Local infiltrating by means of a two per cent novocain solution or applications of powdered cocain for surface anesthesia, is sufficient in almost any case. Reaction is greatest after the chemical and actual cautery, and least following the operations by instruments, as curettes, etc. Light diet, ice pellets, voice rest and mild gargles of hydrogen peroxid and alcohol are very beneficial.

Varicose Veins.—These may be of slight or marked degree, but they require no attention unless they bleed. They are often associated with diseases of the heart, lung and kidney, and are present in many plethoric individuals. Actual cautery is the treatment above all others.

True Vascular Nevus and Ectatic Veins.—These occur at the base of the tongue, but cause little or no trouble.

Tonsilla linguæ lateralis is a condition of hypertrophy of lymphoid tissue just at the plica triangularis. It at times becomes the seat of acute inflammation and often becomes hypertrophied after the removal of the faucial tonsils. Levinstein has reported a very interesting case of this sort which produced marked symptoms which disappeared when this mass of lymphoid tissue was removed.

Associated with hyperkeratosis leptothrici of other parts of the Waldeyer's ring, the same whitish masses are invariably on the base of the tongue. The treatment is indifferent. Usually they disappear spontaneously. According to Katz, there is a form of angina leptothrica in which the base of the tongue is the most frequently involved. This is an inflammatory disease with yellowish white spots, as in follicular tonsillitis. As soon as the acute attack is over, the lingual tonsil should be thoroughly removed.

Tuberculosis of the base of the tongue is usually secondary to lung tuberculosis. The lingual tonsil is involved. Its diagnosis is impossible from its gross appearance. Seifert and Wroblewski have reported such cases, while Schaefert, Lipscher and others have described tuberculosis of the base of the tongue in the form of tumors, such as are seen in the larynx. Tuberculous ulcerations are usually associated with tuberculous ulcerations of the epiglottis. The diagnosis is not difficult. Laryngeal tuberculosis is also commonly present. Heymann had a patient, however, in which the larynx was not involved. The treatment comprehends the removal of the tubercular tumors if possible, but usually the cautery or possibly the curette are the only instruments that can be used.

Lupus of the base of the tongue is considered rare, only about six cases having been recorded in which there were no other areas involved. The treatment is surgical, but X-rays, Finsen and radium have been recommended.

Syphilis of the base of the tongue is seldom a surgical condition. Of one hundred and sixty-nine cases of primary chancre of the oral cavity, according to Kampf, not a single case occurred on the base of the tongue. Secondaries are quite common, either in plaques or swelling of the lingual tonsils. At times this gland becomes large, and if operation is performed by mistake for some other condition, serious complications and consequences may follow.

Gumma, which breaks down, occurs quite frequently, but like other luetic conditions it heals quite rapidly under proper antiluetic treatment.

Injuries of the base of the tongue rarely occur, and only when some sharp object like a piece of bone is swallowed. In one case the sting of a wasp, which happened to be in water which had been swallowed, caused a marked swelling of the base of the tongue which, however, lasted for a short time.

Foreign Bodies at the Base of the Tongue.—Fish bones and bristles are probably the most frequently found. Many cases are recorded in which needles, pins, particles of food, particularly the shells and hulls of certain fruits and vegetables, have been located in the lingual tonsil, where they caused a great deal of trouble until removed. Palpation aids in the laryngoscopic examination. Swallowing a foreign body gives

the patient the feeling as if it was still present. If a foreign body remains in the tissues of the base of the tongue an abscess may result, which is a much more serious condition, which must be treated accordingly. Most foreign bodies may be removed with a curved forceps by the aid of the mirror or by the direct endoscopic method.

TUMORS AT THE BASE OF THE TONGUE.

There are two forms, nonmalignant and malignant. Most of the types of nonmalignant neoplasms have been described. There are some, however, that should have particular mention.

Lingual thyroid may be present as an accessory gland or replacing it. The size varies from that of a hazelnut to that of a small egg. It is usually located in the center, but may sometimes be on the side of the tongue. It is usually smooth and somewhat hard, but if it becomes cystically degenerated it may even fluctuate. They have been known to become infected. I have had one case of each type, one terminating fatally after operation, and one successfully. The condition is virtually an embryologic misfit. Inconsequential symptoms are usually present, but if the gland is large it may change the voice, cause pain and produce difficulty in breathing. The treatment is removal, and this may be accomplished under suspension or externally by a superior pharyngotomy. Care must be exercised to note whether these patients have a thyroid gland in the usual place, before attempting the removal, otherwise myxedema may develop.

Thyroglossal duct tumors or cysts at the base of tongue are retention cysts of dermoid character, according to Bernays and Rosenberg. In one there was actually a tooth present in the sack. These cysts are usually easy to shell out and will not recur. Other types are cysts developing from the region of the foramen cecum, which have been designated as ranula of the base of the tongue. They are filled with a clear fluid. Brayden Kyle and others have described such cases. Hauszel described a case of cysts of the base of the tongue, that was multilocular but very large and firm.

A third form of cysts at the base of the tongue is the one developing from the mucous glands. These are very large at times, but, strange to say, they cause very little inconvenience

and usually are discovered accidentally during the routine examination of the throat. In the removal of these cysts it is well to take away a large part of the cyst wall to prevent recurrence. A fourth type of cysts at the base of the tongue are those of the fossulae of the lymphoid follicle. They are small and contain a mucus-like secretion. These, however, cause discomfort, more especially giving the feeling of a foreign body present. These cysts are best removed in toto with a punch.

Amyloid tumor is a peculiar formation at the base of the tongue, but quite rare. It is usually multiple formation, hard, the size of a cherry or smaller, and has a waxy appearance. The tissue gives a true amyloid reaction. These cases have been found mostly postmortem, although Martuscelli had a case of fibroma of the base of the tongue that had undergone amyloid degeneration.

Lipomata at the base of the tongue are soft yellowish growths which are often unrecognized until the operation. They may be large and yet cause little trouble. Albert describes a case in which the entire isthmus was practically filled and yet the patient (a girl of sixteen years) said she only felt as though a hair was in her throat. These tumors are usually easily peeled out from within, but they may be so large that it would be safer to operate externally. Fletcher Ingals had one such case necessitating external procedure.

Vascular tumors at the base of the tongue are not frequently encountered, in spite of the fact that the blood supply is very abundant. Micheal described a true cavernous tumor which he was able to destroy by actual cautery, and Kronenberg saw a vascular nevus in the region, but the same growth spread to the cheek and the floor of the mouth. Riccioli described a case of fibroangioma of the base of the tongue, which he removed with a hot snare.

Myomata of both striped and unstriped muscle fibers have been found at the base of the tongue by such men as Glas, Baumgarten, and Gasazza. True adenomata have also been described in this region of the base of the tongue.

Fibromata and fibrosarcomata of the base of the tongue are very difficult to differentiate clinically. Haker, Prota,

Kümmel, Marinscelli and others have shown that these may occur as sessile or pediculated.

In the sessile form the differential diagnosis between carcinoma and abscess or gumma is important and at times very difficult, especially as to gumma. The treatment is eminently successful by peeling out the growth if sessile or snaring off if in the pedunculated form.

Papillomata, which occur quite frequently at the base of the tongue, present no diagnostic difficulty. Removal is seldom followed by a recurrence, particularly when it is performed thoroughly by curettage or dissection. A very painful form of papilloma described by Kümmel and Albert arises from the papilla foliata. The pains which are neuralgic in character appear especially when the patient is eating. Chauveau describes this condition as papillary glossedynia.

MALIGNANT TUMORS.

Carcinoma is rarely found in this region unless it has developed from the epiglottis or the tonsils. Butlin, to my mind the greatest author on the tongue, has only seen one case out of eighty which he thought had its primary origin at the base of the tongue. Schmiegelow, Sendziak, Castex, Ziagi, Micheal and Eve have each described a case.

Sarcoma is very rare in the pure form. Up to 1891, only seventeen cases of sarcoma of the tongue were collected by Schelier, and only five of these were of the base. Johnson, in 1904, said he found twenty-five cases reported. These sarcomata occur in two forms. The lymphosarcoma, which resembles the same kind of growth of the tonsil, is pale, soft and very rapidly growing. Its origin is the lymphoid tissue of the base of the tongue and consequently in the lingual tonsils. It is very interesting to note that the regional glands are involved, which is not the rule in sarcomata in other regions. Treatment with large doses of arsenic and iodid of potassium often stops the growth—in fact, it has been seen to disappear partially, and yet microscopic examination proved it to be sarcomatous. The other form of sarcoma at the base of the tongue corresponds to those we meet in the nasopharynx. It is a very hard tumor and the diagnosis can easily be made by the microscope. In the operable cases of malignant growths

in this region it is only when a part of one side is involved that it may be excised and a cure expected, but if the process has extended to neighboring structures or to the other side, radical surgery alone is possible (complete excision). In the inoperable cases of sarcoma, radium is recommended.

CASE REPORTS.

Case 1. Chronic Focal Infection.—Mr. X. complains of feeling miserable most of the time, having frequent colds and rheumatoid pains in and about several joints of the body.

Examination shows a fairly normal nose, several bad teeth, degenerated small tonsils and a markedly coated tongue. He was advised to have the necessary dental work done, as shown by a roentgenogram, and to have his tonsils removed. Following these procedures, the patient improved some, but not entirely. Having excluded other foci of chronic infection and obtaining no benefit from autogenous vaccines, as well as other forms of general tonic treatments, I began to investigate the tongue. Scraping the surface of the tongue and examining this material, I found an enormous bacterial flora. Cleansing the surface further by soap and water, followed by manipulation of the tongue, and again scraping it, I found a considerable reduction in the bacteria.

After a third manipulation of the tongue with cup suction, I still obtained bacteria in fairly large numbers. I now painted the surface with tincture of iodine, ten per cent (official preparation), and waited fifteen minutes, and then repeating the last procedure, namely, manipulation, I was unable to find very many bacteria. These were mostly staphylococci and non-pathogenic bacilli. In making cultures from the first scraping and plating them out subsequently, we found very few streptococci, and these were mostly of the pyogenic type. Following this form of cleansing, namely, washing with soap and water, followed by manipulation and suction and tincture of iodine, which was repeated three times during one week, the patient began to feel better. After that he repeated this cleansing once a week, which he has been keeping up since, now six months. It was noticed in his case, as well as in many others similarly treated, that the tongue would become quite sensitive following too vigorous and frequent applications of the tincture

of iodin. In some of the cases a dilute solution of the tincture of iodine was used, and then this sensitiveness was less observed. The taste for food was markedly improved.

By reason of these observations we have been led to believe that there is considerable absorption from a chronically infected tongue, and we have adopted the routine measure of cleansing the tongue in all cases of chronic focal infections, whether we removed the tonsils or any other focus of infection.

Case 2. Tongue Abscesses.—Mr. D., thirty-two years old, noticed a stiffness in his tongue for several days. This soon became painful, especially when moving it, as in swallowing. Speech became thick and mouthy.

Examination showed a swelling on the side near the middle of the base, which was somewhat tense and not very tender. Temperature, 99. Waiting a few days for observation, I found all the symptoms increased, the patient experiencing a great deal more pain, radiating to the side of head and neck. Swallowing became almost impossible on account of pain, and additional symptoms developed, such as difficulty in breathing when sleeping; temperature, 102. Deciding to open the abscess, I found at the point of fluctuation that I had to go quite deep to get the pus, which was small in amount. It was yellow, and culture showed pure staphylococci. Placing a small piece of gauze into the cavity, I was surprised that it was retained in spite of the movements of swallowing, etc. On the fourth day I injected some bismuth paste, and the patient made a complete recovery. The etiology has never been explained in this case.

Case 3. Angioneurotic Edema of Tongue.—Mr. L., sixty-three years old, noticed a periodical swelling of his tongue for more than a year. Aside from a slight interference in speaking and swallowing, it was of no inconvenience. Of late, the swelling has been getting larger, and the periods which at first were about one to two weeks apart, are now more frequent. During the past week he had two attacks. Furthermore, other portions of the body showed similar manifestations. The lip, one or the other eyelid, the prepuce, and anus were also affected.

At the time of the first examination there appeared to be but a slight enlargement of the tongue; otherwise everything was negative. I instructed the patient to let me know when he noticed the attack coming on, as it usually did with a sensation of burning and full feeling of the tongue. Being called, I found an enormous swelling of his tongue, so much so that it was too large for the mouth and protruded over a very much swollen lip. There was no pain or any other evidence of inflammation. Puncture caused very little bleeding, and the blood had no tendency to coagulate. Repeated tests of blood clotting showed a coagulation period of from fifteen to forty minutes (Sahli and other tests). Estimation of calcium content of the blood by the Simon method showed a marked deficiency of calcium. There was a marked pyorrhea alveolaris present, attention to which made some impression upon the process, but not until after a prolonged treatment by injections of horse serum did I notice any definite improvement. Calcium treatments had little or no effect. Nevertheless, he continued to have the attacks, and in addition developed cerebral attacks in the form of severe periodical headaches, such as are observed in brain tumors and laryngeal obstruction. The laryngeal mirror revealed the typical edematous process. Fearing a severe attack in the early morning hours, I arranged with a neighboring general practitioner either to intubate or tracheotomize him if necessary, and I had at his bedside a complete outfit ready for such procedure. Such an emergency did arise, but the physician was too late to perform the operation, as the patient succumbed before he arrived. Autopsy was fortunately permitted and completely carried out. Aside from a very large but otherwise normal heart, a considerable degree of chronic interstitial nephritis and an enlarged prostate, there was absolutely nothing pathologic demonstrated. The larynx was normal. A suggestion of edema of the brain and spinal cord, and some slight hemorrhages into the brain substance were also found. The non-coagulability of the blood during the postmortem and the delayed rigor mortis were noteworthy. About two pints of blood were saved and a complete physiochemical examination of it was made. (The detailed findings of this work is purposely omitted, because the writer is working with his labora-

tory associate on this subject in several cases of other conditions wherein the blood clotting period was delayed.) The microscopic examination of the brain and spinal cord was negative, and the small hemorrhages had no pathologic basis in the condition of the vessels.

Case 4. Congenital Fissured Tongue.—Miss R., twenty-three years old, noticed that since she had had her thyroid gland removed for hyperthyroidism her tongue appears to be larger and the cuts, as she expressed it, deeper. She has always had these cuts, and her sister and mother also had them. Examination shows the typical picture of a lingua scrotalis (Figure 1). Aside from the peculiar appearance, such a condition of the tongue has no pathologic significance.

Case 5. Leucoplakia of the Tongue.—Mr. M., salesman for many years for a wholesale cigar concern and always a very heavy smoker, noticed for a long time a heavy coating on his tongue, which feels rough and dry and dulls his sense of taste. It was always white until he was advised to use permanganate of potash solution as a mouth wash, since which time it has turned brown. Attempt by him to scrape it off was usually followed by an increase into the growth.

Examination showed a typical case of keratosis of the surface of his tongue, nearly white in character, in addition to which there was a milky white deposit on either side of his buccal surfaces. The teeth are in excellent condition. He is otherwise perfectly well and denies any specific disease. Wassermann test is negative. Salvarsan was given; Wassermann still negative; no influence on the condition. X-ray treatment was very beneficial, but in due time the process returned. He is now under treatment with radium applications (fifty milligrams pure radium applied for a period of two hours twice a week). Thus far there can be seen no change in the condition.

Case 6. Hypertrophy of the Lingual Tonsil.—Mrs. McT. has had for some time vague symptoms in her throat, such as a full feeling, desire to clear it, coughing and swallowing. It feels as though there was something foreign sticking there. She noticed at times streaks of blood in her expectoration. She is otherwise very nervous.

Examination shows a marked hypertrophy of the lymphoid mass to either side of the epiglottis. The veins were consid-

erably dilated. The treatment consisted in repeated cauterizations—that is, different areas were burned with the actual cautery at each sitting. The result was perfect in every way.

Case 7. Decubitus Ulcer of the Margin of the Tongue.—Mr. Cl., twenty-two years old. For more than a month he noticed that his tongue was sore and often would bleed slightly. Examination showed a small ulcer on the side of the tongue with somewhat indurated edges which correspond to the outline of a jagged edged tooth. The diagnosis and treatment consisted in removing the tooth, whereupon the ulcer healed promptly.

Case 8. Decubitus Ulcer.—Miss S., thirty-eight years old. The history was very much like that of case 7, with the exception that the ulcer has been present for about four months and she has noticed some glands in the neck corresponding to the side of the tongue affected. The tooth was drawn and the ulcer treated by applying Kimmel's mixture, with little or no effect. The ulcer was excised widely with considerable healthy tongue tissue and the defect repaired. The microscopic examination was negative as to carcinoma or any other disease such as tuberculosis or lues. I consider this the rational treatment of a precancerous state. The glands in the neck were not touched in consequence of the microscopic findings. If they had been carcinomatous it would have been necessary to dissect out the glands radically. They disappeared within two to three months after the operation on the tongue.

Case 9. Varicosities at the Base of the Tongue.—Mr. Br., sixty years of age, complains of hoarseness which comes and goes. Examination: Slight congestion about his ventricular bands as well as the vocal cords. At the base of the tongue is a large mass of dilated tortuous veins, largest near the pyriform fossa and gradually thinning out as the dorsum of the tongue is reached. Since they were not bleeding or causing any other particular discomfort, there was no treatment applied.

Case 10. Radium Burn of the Tongue.—Mr. Stn., thirty-nine years old, was referred on account of a small swelling on his right upper alveolar region. Microscopic examination proved it to be a sarcoma, and radium was advised. One hundred and fifty milligrams of pure radium was applied by the

radium expert (for that is the procedure I believe should be followed when using radium) for a period of eight hours. Then the following day the dose was repeated. On the third day he began to complain of a hot sensation on the side of his mouth corresponding to the location of the radium tube. On examination one could see a marked hyperemic area. Similar ones were also present on the inner surface of the cheek and the roof of the mouth. The hot sensation was supplanted by a pain which soon became unbearable, and the patient could not eat without a great deal of pain, so refused food, even drink. About the fifth day the red surface took on a filmy appearance and all the evidences of a superficial necrosis. Incidentally the original sarcomatous growth began to vanish. The use of local anesthetic was of little or no benefit, and it became absolutely necessary to feed the patient by stomach tube in order to sustain strength. Figure 2 shows the leathery appearance of the burn. The condition continued almost two months without abatement. The physician was compelled to inject novacain before each meal in order that the patient could eat or drink. About four months from the time of the application of the radium, there was noticed a recurrence of the growth, and so rapid was this that within two weeks the greater part of the right superior maxilla was affected, and the patient died suddenly as though of brain embolism. Shortly before death the laryngologist who referred the case to me stated that the tongue looked almost normal with no evidence of cicatrices.

Case 11. Lupus of the Tongue.—Mr. Jld., twenty-five years old. Pain on the left side of his tongue for about a month, when he bit it while cracking a nut. Examination shows a swelling on the side and surface of the tongue close to the base and reaching pretty well anteriorly. It is somewhat tender to the touch and hard, with the exception of one place, which appears to fluctuate. I made a diagnosis of an infection, with the possibility of abscess formation. The above mentioned softened spot opened, and a small amount of watery discharge escaped. Some secretion from this area was expressed and examined bacteriologically, but did not reveal any tubercle bacilli nor any other organism in pure culture, only the

usual tongue flora being present. After about two weeks of observation and no improvement following simple local treatment, I excised a piece for microscopic examination, and demonstrated tissue characteristic of tuberculosis except there did not appear to be any caseation. Observing that the primarily involved area appeared to be healing and newer areas starting up, I concluded that I had to deal here probably with a case of lupus. The patient was subjected to the treatment of deep X-rays, and after twenty-seven applications spread out over a period of four months, the tongue was healed and patient discharged.

The patient's tongue was photographed stereoscopically at various times during the treatment, so as to show the progress or influence of the treatment, and Figures 3 to 9 demonstrate this very satisfactorily. Two years after treatment the patient remains absolutely well, but as can be seen in the last photograph there are many scars present in the healed-out process.

Case 12. Thyroid Abscess at Base of the Tongue.—Mr. Klm., forty-seven years old. The patient was brought to the hospital as an emergency case by a laryngologist, who stated that he was called to see this man the day before on account of great difficulty in breathing and swallowing. It was stated to him that that difficulty had appeared only about three days previously, gradually getting worse. Examination by the laryngologist in the house was very unsatisfactory, so he gave him some kind of a gargle and asked him to come to the office the next morning. The patient did not sleep all night, and his dyspnea had increased so that he was very weak. On depressing the tongue, the physician could see a smooth swelling corresponding to the epiglottis, and he concluded that it was either edema or an abscess of the epiglottis. At all events, incision was absolutely indicated, and he made a number of punctures which were followed by copious bleeding. There appeared to be some relief following this treatment and patient started home, but never got there. The doctor was hurriedly called, and found the man practically exhausted. In this condition he was brought to me, being scarcely able to drag himself to the examining room. One look at the patient

showed that he was dying, struggling for air. Placing him on the table without any preparations, I made a stab tracheotomy, but he made no attempt to breathe and artificial respiration had no effect. He appeared to have succumbed to exhaustion. A coroner case was made out of it because the postmortem was refused, and I was fortunately permitted to be present at the examination. It was found that at the base of the tongue was a mass somewhat smooth in outline and semisolid in consistency, having several hemorrhagic areas, which corresponded to the punctures made by the doctor. The epiglottis was normal. This mass was incised and found to be made up of thyroid tissue. In the center was a definitely localized abscess with a thick wall. Microscopic examination demonstrated:

1. Thyroid tissue of cystic variety and acute thyroiditis.
2. Abscess wall, old.
3. *Staphylococcus pyogenes aureus* obtained from the abscess.

The other organs of the body showed very little trouble, the heart in diastole, lungs normal, but there were nontubercular abscesses in the kidneys.

Case 13. Thyroid Gland at Base of the Tongue.—Mrs. McD., thirty-four years old. Has noticed for several years a swelling at the back of her tongue, especially if she protruded it, and gags. She could also feel it with her finger. It never bothered her until she had some gynecologic operations performed (various cysts were removed), when this growth began to increase in size and caused difficulty in breathing and speaking. A laryngologist was consulted, and thinking it a cyst of the epiglottis, thrust a needle with syringe attached into the tumor, but only a slight amount of blood fluid was aspirated. The patient was referred to me by this laryngologist, and I found that the epiglottis was mashed flat against the tongue by a growth which appeared to be smooth and rubber-like in feeling. I made the diagnosis of an accessory thyroid gland and advised removal of the right portion by means of suspension. This, however, was impossible, because we could not get a purchase on the spatula, and besides the patient could not breathe on account of pressure on the glottis. It was also

discovered that it was impossible to perform the operation under local anesthesia, because the patient was too nervous, and would not consent unless a general anesthetic was administered. A rectal or scopolaminmorphin anesthetic would have been preferable, but neither was at hand, so I decided to remove the growth by the external route, by means of pharyngotomy. Fearing considerable hemorrhage which could not be controlled without interfering with the breathing, I decided to do a temporary tracheotomy, which proved to be a wise move, both for control of breathing and anesthesia. The growth (Figure 10) was peeled off without any difficulty, and the raw surface stitched after ligation of three or four larger vessels. The patient made an uneventful recovery. The tracheal canula was removed before the end of a week.

Case 14. Carcinoma of the Tip of the Tongue.—Mr. Ldw., forty-six years old, for more than six months has had a sore on the tip of his tongue, and in the past two or three weeks there is bleeding whenever he eats anything. Pain is also present and treatment seems to be without avail. Examination shows a healthy, strong man, who states that he has never been sick a day in his life, has a healthy family and good family history as to tuberculosis, lues and carcinoma. He has, however, smoked a pipe for many years, of a type whose tip is made of horn and is bent in such a manner as to come in contact with that part of the tongue that is involved. This shows a crater-like ulcer with hard edges, and this ulceration extends to the floor of the mouth and inner surface of the mandible. There are no evidences of submental gland involvement. The rest of the physical examination is negative. The blood examination as to Wassermann is negative, and smears from the ulcer show no indication of either tuberculosis or lues. A piece of tissue was excised and examined microscopically and found to be carcinoma. I advised the excision of the greater portion of the anterior part of the tongue and floor of the mouth, including the submaxillary and sublingual salivary glands, also the inner surface of the mandible as far as the bone. I decided to do the whole operation by the aid of the Percy cautery, under general intratracheal ether anesthesia. The vapor was usually not blown when the cautery was in the mouth. There was at no time the slightest evi-

dence of the action of the heat and ether. The result primarily was all that one could desire. The patient was able to take nourishment the next day, and the wound was healing very nicely. The alveolar region, however, did not granulate as it should, and three weeks after the operation I noticed that a portion of the jaw appeared to be necrotic and sequestering. I made out that such was the case and very easily removed it. Figure 11 shows what I believe to be a sequestrum due to coagulation necrosis of the Percy cautery. It was very satisfactory because it assured against my likelihood of any carcinoma involvement of the lower jaw. Figure 12 shows the case three months after operation. I was happy and felt that the case was cured. Eight months after the operation the patient returned with a swelling on the side of his neck which he said came on quite recently. He did not associate this at all with his original trouble, therefore did not come at once. Besides it was not giving him any trouble. Figure 13 shows a marked recurrence in the glands of the neck, but in the mouth and pharynx there is no evidence of any recurrence. This shows how imperative it is always to remove the glands of the neck en bloc, even though they are normal, in cases of cancer of the tongue.

I operated on this mass of cancerous glands, removing the carotid artery and internal jugular vein, muscles, etc., but there was a recurrence and the patient succumbed.

Case 15. Carcinoma of the Side of the Tongue.—Mr. Mlr., fifty-three years old, for more than six months has had a sore, swollen tongue which is being treated with medicines by his family doctor. Examination shows a very strong man, who states that he has always enjoyed good health. Never smoked. Family and venereal history negative. Wassermann negative. A piece of tissue excised from the main mass (Figure 14) was proven carcinomatous by microscopic examination. Radical operation was advised. First I resected the glands en bloc, deep and superficial, under local anesthetic. The wound was left open for several days and deep X-ray treatments employed. Two weeks later I excised through external wound and pharyngotomy more than one-half of the tongue, turning the remaining tip back and stitching it towards the base. The external wound was closed. Patient recovered and was

able to swallow fairly well in ten days. Three months later he returned with carcinoma at the base of the tongue and pyriform fossa which was declared inoperable, the patient succumbing within a short time after that.

Case 16. Carcinoma of the Tongue, Tonsil and Floor of Mouth, Including Glands of the Neck.—Mr. Bzd., forty-three years old, has felt a soreness, in back of his mouth on the right side near the tongue, for about two months, particularly when swallowing.

Examination showed an ulcerated area on the right side of the tongue and the bottom of the outside pillar. A part of the gingival margins of the last molar was also involved. This tooth was very much decayed and had very sharp edges. There was a mass of glands below the angle of the lower jaw in the right side, which were fairly movable. Physical examination showed a well preserved man, with no evidence of any other pathologic condition. Wassermann was negative, and the microscopic examination of a piece of the tissue proved it to be a carcinoma.

Operation.—By means of local infiltration anesthesia of the neck region the mass of glands was removed. The external carotid artery and internal jugular vein were so adherent in the mass as to be impossible of dissection. I therefore resected both arteries and vein with the mass. This latter extended up towards the styloid process region and great difficulty was encountered in ligation of the vein. The wound was united and it healed by primary union. The subsequent microscopic examination of the glands removed proved them to be carcinomatous, but the vein and artery were free from cancer cells. This was particularly studied, because it is stated by authors on the subject that arterial walls are never directly affected by cancer, except by way of ulceration of adhesion.

Two weeks later, under combined method of anesthesia, namely, morphin, grain one-half, hypodermatically, local infiltration of novocain, as well as application of pure cocain over mucous membrane surfaces and nitrous oxid analgesia, I removed two-thirds of his tongue by means of the Percy (so-called) cold iron. I also thoroughly attached with this heated instrument the anterior pillar, including the tonsil, especially at the base and floor of the mouth. He complained considera-

bly of the toothache at first while the heated instrument was employed, and we could feel that his teeth were very warm. This tooth pain entirely disappeared as we progressed with the operation (anesthesia of tooth pulp by excessive heat). There was practically no bleeding and the secretions were sucked up as rapidly as they formed by a suction apparatus.

Patient sat up immediately after the operation and took down a glass of water without any difficulty; of course it had to be poured into his mouth. Patient made an uneventful recovery, and at the end of two weeks left the hospital with the condition as shown in Figure 15. There is no evidence of any recurrence of carcinoma, and the patient is gaining in weight. He has some difficulty in opening his mouth (partial ankylosis), which he developed following the first operation of high dissection. This, too, made the second operation more difficult. He can swallow fairly well and manipulates the remains of his tongue in a very grotesque manner. His speech is practically unintelligible. The test of his teeth by a dentist shows that they are alive and that the excessive heat did not permanently destroy the nerves of the teeth. This is in contradistinction to what followed in case 14. It is my intention to have an artificial tongue made for him, such as recommended in the handbook of Preysing, Katz and Blumenfeld, Vol. 1, 2, p. 112.

Case 17. Carcinoma at Base of the Tongue.—Maj. Ads., fifty-eight years old. A laryngologist has been observing this man on account of hoarseness and some difficulty in swallowing, but only for a short period of time. These symptoms have been noted by the patient only about a month. His general health, however, appeared to be failing for some time. He has been having chronic bronchitis for years. The doctor noted the larynx negative, but in the vellicular region there appeared to be a large ulcer that affected the lingual surface of the epiglottis. The patient being an elderly man, and the ulcer not responding to the simple treatment, the doctor decided upon more active diagnosis and treatment, and referred the case to me. I found a much emaciated man, but was told that he always had been thin, although he had lost some weight. Laryngoscopic examination showed a condition corresponding to the description of the physicians. There was no evidence

of any glandular involvement of the neck; the larynx itself as well as the esophagus was absolutely negative. Blood, sputum, etc., were negative. A piece of tissue was removed, examined microscopically and found to be made up of granulation tissue. Consequently a careful examination was made for tuberculosis, since he gave a history of chronic bronchitis, and since, as is stated in the paper upon Butlin's authority, cancer at the base of the tongue is extremely rare. The roentgenographic examination of the chest as well as a very thorough physical examination, was negative as to tuberculosis. In spite of a negative Wassermann, I gave him two salvarsan injections, but there was no improvement in the ulceration. I again suspended him and took more tissue deeper within the ulcer and near the edges, and found that it was a carcinoma. I therefore advised a radical operation, which was performed by means of a transhyoidal incision. A general, however, light, anesthetic was given, but that I believe was the mistake which spoiled what promised to be a cure of a case of cancer of the tongue. The entire tongue, including the hyoid bone and epiglottis, was removed and the wound sutured, although I did not expect it to remain closed. A side drain was inserted into the esophagus and brought out through the nose (Figure 16) for subsequent feeding until the wound was healed. Figures 17 and 18 show the growth removed, wide enough to prevent any possibility of implantation carcinoma. The patient rallied surprisingly rapidly from the operation. On the third day he became somewhat weak and was unable to clear the secretion from his bronchial tubes. We now began to use suction, which should have been done right after the operation, but in spite of all our efforts the patient grew weaker and at the end of ten days he succumbed to general anesthesia.

Case 18. Angioma of the Tongue, Also Involving the Floor of the Mouth.—Baby Wts., one year and seven months old. Mother noticed that shortly after the baby was born its tongue appeared somewhat thicker than the other infants she had raised, and that it was always blue. Calling the family physician's attention to it, she was told that it was due to the baby having been born with the umbilical cord about its neck and that it would disappear. Consequently the mother paid very little attention to this condition until she noticed that the baby

had difficulty in nursing. It appeared not to have room enough in its mouth for the nipple. Another physician saw it and made the proper diagnosis. The case was then referred to me, and I found that not alone was the greater portion of its tongue involved, but also the floor of the mouth so that the submental and submaxillary region puffed out like an overfat baby. These latter masses were, however, very much softer than the tongue process. Figure 19 shows the condition. At this time alarming signs presented themselves, in that the baby was not getting enough air. Therefore radium or X-ray treatments could not be considered. Some surgical measure was necessary. I decided upon the plan first suggested by my brother, Dr. Carl Beck, to ligate the angiomatous tissue in small masses by subcutaneous chromicized catgut, thus shutting off gradually the blood supply and not causing any sloughing. The immediate result was the reduction in the size of the tongue, and the baby did well for about two weeks, when it developed an attack of diarrhea which appeared to pull it down. There was also present a low grade infection in one of the ligatures. Owing to the previous starvation and the attack of summer diarrhea it could not stand this surgical procedure and died. I might say that at the time of the ligations I excised a small piece of tissue for microscopic examination and found it to be a cavernous angioma, with very little connective tissue about the blood vessels. This type of angioma are usually of a more malignant type, although they have no relation to a real malignant growth.

Case 19. Angioma of the Tongue Proper.—Mr. Bhm., thirty-seven years old, as long as he can remember, has had a swelling of his tongue, which did not bother him except that at times he would bite it while chewing, and it would bleed considerably. The consistency of the mass was softer than the normal structure of the tongue, and it had a distinctly bluish color. Feeling that it was nonmalignant, I advised treatment. I injected boiling water into the mass, usually about a dram at a time, in different areas each sitting. The result was all anyone could desire: absolute cure.

Case 20. Syphilis of the Tongue.—Mr. McC., thirty-seven years old. About six months ago his tongue became sore in several places, but particularly near the middle. In spite of

medical attention, by means of washes and local applications, it steadily grew worse, so that it actually hurt him to eat and he preferred to abstain from food. He gave a negative history as to syphilis and tuberculosis, and otherwise the history was negative relative to the present complaint. He had lost about thirty pounds. He decided to consult another physician, or rather a surgeon, who made the diagnosis of probable malignant disease, and removed a piece of tissue for microscopic examination. He was told that this verified the diagnosis of carcinoma. Radical operation of removal of his tongue was advised. The prospects of such an operation made the patient and the family very apprehensive, and they decided to get further advice. At this stage I saw the patient and found a tongue very suspicious of malignant disease. This was particularly due to the recent excision of a piece for microscopic examination (Figure 20). There had not been any Wassermann reaction. He was immediately given a large dose of salvarsan, which was repeated three times. The immediate result from this treatment was astonishing, for within two weeks his tongue was practically well and he had gained several pounds in weight. He was feeling otherwise much better, especially his mental processes. It interested me very much to see the microscopic section upon which the diagnosis of malignancy was made, but that privilege was refused me. The patient was further put on a thorough mercury cure, and at the last time I saw him, several months after he was discharged, his tongue was perfectly healed, although there are scars present. (Figure 21.)

Case 21. Chancre of the Tongue.—Mr. Pfl., twenty-nine years old, was bitten by a prostitute while kissing. The bite, which was only sore for a day or two, healed and patient forgot all about it until two weeks later he noticed at the site of the bite a hardness which soon became very large so as to take in almost the entire tongue. It was very painful to move the tongue. A physician who saw it at the time thought that it was an abscess and brought the case to me for operation. The history, period of the incubation, and the point of softening made me decide to wait a day or two to see developments. The Wassermann was negative. Hot mouth washes relieved the pain considerably. The softened area broke down and we

were able to obtain the *spirocheta pallida*. Having read a report by Taylor of the good result of excising a primary sore of the tongue, in that he said the length of the general treatment was much shortened, I gave advice accordingly and was permitted to operate. There appeared to be a general infiltration of the tongue. There was, however, a definite area confined to about the place of the original bite. I excised the chancre, therefore, under infiltration anesthesia, and treated it as an open wound. It healed promptly, perhaps because he was given a large dose of salvarsan and inunctions of mercury. After six weeks of treatment I desisted from doing anything further except to make monthly Wassermann tests, and this for five months have been absolutely negative. At the seat of the excision is a bad looking scar. I attempted to stain the spirochete in the tissue, but this, however, proved impossible. All we had was highly inflammatory tissue within the tongue structure.

Case 22. Mucous Patches and Gumma of Tongue. Secondary Infection.—Mr. Tm., forty-nine years old, contracted syphilis about a year ago, and the process of passing from the primary lesion to the gummatous stage was the most rapid and widespread of any case that I have ever seen. Some of the best consultants in the case pronounced it the most malignant case of syphilis they had ever encountered. Treatment (before salvarsan was known) was absolutely of no avail. I wish to mention some of the lesions the patient had before he succumbed to a septic meningitis:

1. Primary sore on the glans penis.
2. Bilateral suppurative buboes.
3. A rash (early secondary), almost like a scarlatina.
4. Marked general adenopathy.
5. Marked plaque formation on the tongue, cheeks and palate.
6. Severe rhinopharyngolaryngitis.
7. Every finger and toe nail was affected.
8. Ulcerations of the nose with rapid sequestration, finally making a large opening in the hard palate.

9. Osteoperiostitis of the frontal bone with mass sequestration.

10. Sinking in of the bridge of the nose.

11. Ulcerative processes of the rectum and colon with hemorrhages.

12. Bilateral suppuration of his middle ears.

13. Three slight attacks of iridoscleritis.

14. Tibial necrosis.

15. Meningitis following an attack of erysipelas, apparently arising at the fistula in the frontal bone, and about the time that he had the slight attacks of iridoscleritis, markedly swollen base and side of the tongue, which broke down and became secondarily infected. Aside from the usual cleansing, there was not much to be done for this tongue affection, since any antisypilitic treatment, whether by mouth, inunction or injection of mercury and iodids, made no impression upon this or any other of his lesions. The endurance of this man was most remarkable, because his digestion and rest were so much disturbed. It was necessary to resort to morphin to control some of the neuralgias from which he suffered.

I wish to name some of those who have seen this man, in order to show that nothing was left undone to stem this galloping type of syphilis: Dr. J. Nevens Hyde, Dr. Carl Beck, Dr. V. Vaughan, Dr. Jelks, Dr. Wolf Freudenthal, Dr. Lustgarten and Dr. Lieben.

Another interesting fact is that he infected his wife, who had also a very rapid destructive process of her nose, but treatment by mercury and potassium iodid appeared to stop the progress of the disease. The case was under my care at the time that the Wassermann test and the spirocheta pallida were unknown, but I have since made a test on the surviving wife and four children, and found that the mother still has a positive Wassermann, and the children, which, of course, could have become infected by accident, were negative. The mother refuses to be treated, notwithstanding the existence of a marked crusting ozena and the +++ Wassermann.

In this connection I wish to mention another case, although not as rapidly destructive, yet much like it and absolutely not influenced by the usual antisyphilitic treatment. His patches on the tongue were constantly recurring and very painful,

requiring the use of cocain in order for him to be able to take food. He was about to have a breaking down of a septal and palatal gumma when the trial salvarsan came to Chicago, his Wassermann test having shown a + + + positive. Immediately after the first injection, which by the way was followed by a terrific reaction of vomiting, etc., the local conditions in his nose, mouth, etc., were very much improved, and after about eight more injections, within six months he was absolutely cured. His Wassermann became negative after sufficient length of time elapsed after treatment and has remained so now several years without any treatment.

Case 23. The Tongue in Acute Lymphatic Leukemia.—Mr. Bsb., twenty-eight years old, has never been ill that he can remember. About three months ago he began to feel a pressure in his head and at times a headache and a slight dizziness and a tired feeling. His appetite began to fail, and he was losing in weight. He also noticed nose bleeding, which was not easily stopped. About two weeks ago he noted a thickness of his tongue which interfered with his speech. It itched considerably, and this was relieved by pieces of ice held in the mouth. He consulted a doctor, who took an electrically heated needle and pierced the tip of his tongue. This did not give him any relief—in fact, he felt worse. At this time I saw him and found an anemic individual whose tongue was larger than normal, somewhat hard to the touch, but not tender. His voice was thick. Depressing his tongue with some difficulty, I found the pale mucous membrane of his pharynx and two enormously enlarged tonsils, smooth and not inflamed.

A complete physical examination was made, and with the exception of some enlarged lymph nodes in the neck, axilla, epitrochlear, inguinal and palatal region, there could be found nothing pathologic. On the following day the tongue began to show a triangular demarcation with the apex at the tip. This rapidly broke down in the form of a slough, and correspondingly he developed a temperature and small hemorrhages from his gums. Daily blood examinations were made and were as follows:

July 5, 1916. Blood examination: Blood count.—Red cells, 3,200,000; hemoglobin, 65 per cent (Sahli); white cells,

93,600. Blood smear—Normal cells; small lymphocytes, 81; large lymphocytes, 17; polymorphonuclears, 1. Blood smear—Pathologic cells; pathologic lymphocytes, 1 per cent.

July 6, 1916. Blood count—Red cells, 2,800,000; hemoglobin (Sahli), 45 per cent; white cells, 90,000. Blood smear—Normal cells; small lymphocytes, 91; large lymphocytes, 8; transitional, 1.

July 7, 1916. Blood count—Red cells, 1,600,000; hemoglobin (Talquist), 40 per cent, (Sahli), 40-45 per cent; white cells, 60,000. Blood smear—Normal cells; small lymphocytes, 57; large lymphocytes, 41. Pathologic cells—Myelocytes, 1; pathologic lymphocytes, 1.

July 7, 1916. Taken after transfusion at 2 p. m. Blood count—Red cells, 2,080,000; hemoglobin (Sahli), 45 per cent; coagulation time, 15 minutes, 5 minutes; white cells, 40-400. Blood smear—Normal cells; small lymphocytes, 84; large lymphocytes, 15; transitional, 1.

July 8, 1916. Blood count—Red cells, 2,800,000; hemoglobin (Talquist), 45 per cent; white cells, 100,000. Blood smear—Normal cells; small lymphocytes, 22; large lymphocytes, 70; large mononuclears, 5; polymorphonuclears, 1. Pathologic cells—Myelocytes, 2.

July 9th. Blood count—Red cells, 2,000,000; hemoglobin (Talquist), (Sahli), 45 per cent; white cells, 69,400. Blood smear—Normal cells; small lymphocytes, 20; large lymphocytes, 73; large mononuclears, 4; polymorphonuclears, 1. Pathologic cells—Myelocytes, 2.

July 11th. Blood count—Red cells, 1,760,000; white cells, 42,600. Blood smear—Normal cells; small lymphocytes, —; large lymphocytes, 92; transitional, 2; polymorphonuclears, 2. Pathologic cells—Myelocytes, 3; normoblasts, 1.

July 15, 1916. Blood count—Red cells, 1,280,000; hemoglobin (Talquist), (Sahli), 40 per cent; white cells, 50,200. Blood smear—Normal cells; small lymphocytes, 9; large lymphocytes, 20; large mononuclears, 65; polymorphonuclears, 1. Pathologic cells—Myelocytes, 5.

July 18th. Blood count—Red cells, 1,400,000; hemoglobin (Talquist), 35-40 per cent; white cells, 81,800. Blood smear—Normal cells; small lymphocytes, 88; large lymphocytes, 7;

large mononuclears, 2. Pathologic cells—Myelocytes, 2; pathologic lymphocytes, 1.

July 20th. Blood count—Red cells, 1,040,000; hemoglobin (Talquist), 35 to 40 per cent; white cells, 75,000. Blood smear—Normal cells; small lymphocytes, 71; large lymphocytes, 23; transitional, 2; polymorphonuclears, 3. Pathologic cells—Normoblasts, 1.

July 23rd. Blood count—Red cells, 80,000; hemoglobin (Talquist), 30 per cent; white cells, 103,000. Blood smear—Normal cells; small lymphocytes, 34; large lymphocytes, 35; large mononuclears, 21; transitional, 2. Pathologic cells—Myelocytes, 4; microcytes, 4.

The Figures 22 to 26 show the progress of the tongue destruction. Within ten days from his first visit he died, in spite of every effort, such as X-ray treatment, transfusion of blood and other medications. The tongue affection in connection with acute lymphatic leukemia is not recorded, and the fact that he had a feeling of stiffness of the tongue for a long period made it possible to draw the analogy between it and priapism.

Case 24. *Lingua Nigra* (Black Hairy Tongue.)—Mr. Chn., thirty years old, has noticed a heavy coating on the tongue, mainly in the middle and far back, but some of the material reaching almost to the tip. It has never troubled him until recently, except that he kept observing it and fearing it might lead to something worse. Recently he has noticed an irritation of the back of his throat that makes him cough, especially at night. He also complains of a very foul breath. Examination shows a thin, nervous man with a dirty brownish looking mass in the center of his tongue near the base, tapering towards the tip. The remainder of the tongue is also heavily coated but not discolored, nor has it the hairy appearance when a spatula is used to remove the coating. A particle removed and examined microscopically shows masses of hornified pigmental epithelium, which does not take on any skin. He has markedly diseased tonsils and caseous masses, many cavities in his teeth. With a flat electric cautery point I removed the entire mass, searing the base well. In due time I removed his tonsils and had his teeth put in shape. I have

seen this man regularly every few months for years, and there has never been any recurrence.

Case 25. Fish Bone in Tongue.—Mr. R., while eating some fish, noticed a bone lodged in his throat, and try as he might he could not dislodge it. Being a heavy smoker and having a highly irritable throat, he was very much disturbed with the irritation in that it made him gag, cough and have a constant desire to swallow. He went to two laryngologists, who were unable to locate the bone, either by inspection or palpation, and concluded that he had been probably scratched by a bone. He felt better when they applied some cocain, so one of the physicians gave him an atomizer with a five per cent solution of cocain, and some bromids internally. He could not sleep and became very much excited, so the family physician was called, and when he could find nothing by looking directly or feeling with his finger he brought the patient to me. I could find no evidence of any fish bone, but patient had a very red pharynx. I had read just a few days previously that fish bone will take on the stain of India ink deeper than other tissue, which fact might be used for diagnostic measures in such cases. Consequently I made up a solution of Chinese ink about twenty-five parts of water to one part of the commercial ink and let the patient swallow it slowly. By means of the laryngeal mirror I could distinctly make out the central circumvallate gland much darker than the rest of the tongue. Palpating this region I could not feel any fish bone. After observing it again and again, allowing him to rinse his mouth and finding that that spot remained black, I made up my mind that the finger pushed the bone into the gland when palpating. Consequently I took a pair of curved artery forceps, opened them and employed them in the form of a tongue depressor. The particular circumvallate gland that was supposed to contain the fish bone was engaged between the two blades of the forceps. While making firm pressure, the fish bone could be seen sticking out. I now grasped it and pulled it out. It measured a little over one and one-half inches, the protruding end being very sharp.

Case 26. Unilateral Paralysis of the Tongue.—Mrs. Alx., twenty-four years old, for over a year has been having pains in her head, radiating into her neck, especially on her left side.

The eye on the same side appeared to be larger and protruding. At times she had diplopia. She had some difficulty in getting her food down the esophagus and her speech was somewhat changed. She also noticed that one-half side of her tongue did not work. There were times that she would be dizzy and feel nauseated, but she never vomited. Examination showed a moderate exophthalmos, spontaneous nystagmus to the left. The vessels (veins) of both fundi were dilated, but there was no distinct choked disc.

The ears were negative in every way. No vestibular, cerebellar or cerebral disturbances demonstrable. The nose was negative. The soft palate was paralyzed on the left side.

The tongue was paralyzed on the same side, and there were evidences of partial atrophy (Figure 27). The pharynx was otherwise negative. There was less of motion and sensation on the left side of the larynx. The left shoulder could not be raised as well, and it looked thinner than the opposite side. Otherwise there was nothing abnormal as to the physical and laboratory examination. This included spinal puncture and thorough examination of the fluid, and blood and X-ray. The sight was rapidly failing and the head pains were increasing, so I determined to do a decompression as well as explore the posterior or cerebellar fossa in the region of the foramen lacerum posterior, because I suspected a tumor in this area. I determined to reach this area by way of the posterior cerebral fossa—that is, lift up the occipital lobe and open the tentorium cerebelli. All went according to the plan until I lifted or rather displaced the brain, which was very much facilitated by a ventricular puncture. The tentorium appeared darker in color and very tense. As soon as I opened it, making an incision a distance away from any of the sinuses, there occurred a very profuse bleeding, venous in character. I put in a large gauze sponge which controlled the bleeding absolutely. By holding the sponge over the bleeding area, I was able to determine that the lateral sinus was not injured. Removing the gauze very slowly, the blood welled up the same as when the incision was made, so I again repacked and left the sponge in place. I placed, however, a piece of rubber tissue between the gauze and the brain tissue to prevent adhesions. The end of the gauze was allowed to protrude through the wound,

which had to be larger than for ordinary drainage. I expected some trouble in this case, but to my surprise there was not any. The gauze and rubber tissue was removed on the fourth day and the wound allowed to close. The patient recovered from the operation as well as from the pressure symptoms of the eyes and pains in the head. The organs supplied by the cranial nerves that were involved, however, never improved, but the condition did not progress. The tongue remains the same now, several years since the operation. I have never ventured to speculate upon the exact diagnosis, but I feel that it may have been a vascular tumor or aneurism.

Case 27. Unilateral Paralysis of the Tongue.—Miss Wrgt., nineteen years old, was operated by a competent otologist for radical mastoid, and facial paralysis unfortunately resulted. After waiting long enough for spontaneous recovery or improvement which did not occur, the patient was referred to me for a nerve plastic operation. It was decided to do a facial hypoglossal end-to-end operation. There is nothing unusual to record as to further findings or the operation. The following day I was astonished to find that her tongue was not even paretic on the operated side, and it took nearly a week before complete paralysis of the side of the tongue was established. Figure 28 shows the position of the tongue on the fourth day after the operation, still straight. By the way, it is now nearly two years since the operation, and the doctor reports that the patient has a good motion of the face of the anastomosed side.

Case 28. Bilateral Paralysis of the Tongue.—Mr. Dgt., forty years old, has been very much depressed on account of inability to obtain work, etc., and decided to commit suicide. By means of a razor he made a high bilateral pharyngotomy, catching both hypoglossal nerves. His attempt was not successful, as he was within a short distance of the Cook County Hospital, where the resident tied some of the vessels and closed the wound. Patient recovered quickly, with the result, however, of not being able to protrude his tongue. Examination showed everything normal within the oropharynx and larynx. There was a tendency for the tongue to drop back, especially during sleep on his back, causing some disturbance in breathing and producing a great deal of noise. His speech was also defective, as one can demonstrate if he

attempt to speak without the motion of the tongue. The patient was not willing to cooperate in order to get well, consequently I had a great deal of trouble to get his consent for an operation. I decided that the sooner a readaptation and suturing of the severed ends of the hypoglossal nerves could be done the better would be the result. I finally got his consent and found the procedure not at all difficult. Aside from the surgical experience this criminal condition will not be of any scientific or humanitarian value, because the patient made another attempt soon after he recovered from the operation, which was successful, this time hanging himself on the gas fixture. Figure 29 shows the tongue six weeks after the operation, undoubted evidence of atrophy.

CASES—TRAUMA OF THE TONGUE.

Some of the following individual conditions have presented themselves to me, and I will simply record them, since every case of trauma is a type of its own and its treated according to the best judgment of the physician.

1. Tongue bite during epileptic paroxysms.

2. Boy had the habit of protruding his tongue in making grimaces. Another boy wished to stop him from doing it, so delivered a blow from left ear upwards, making the upper and lower teeth meet. This caused practically the whole anterior portion of the tongue to be cut off. Immediate suturing saved it.

3. Boy while running fell, striking his lower jaw against a step. The tongue protruding at the time, was bitten through on one side. Immediate suture, primary healing.

4. Young man eating spaghetti in a hurry, strikes his tongue with a point of the fork. Marked reaction and infection followed, requiring incision; rapid recovery.

5. A dentist while cleaning the teeth of a lady, using a small sandpaper wheel on an electric engine, cuts the side of her tongue. The bleeding becomes uncontrollable by simple methods. I placed a stitch through this very slit, but employed silkworm gut drain. Uneventful recovery.

6. Scorching of the tongue and the rest of the buccal cavity by hot water to relieve a toothache. Keeping sweet butter in the mouth gave prompt relief from the effect of the burn.

7. Light degree of superficial destruction from the use of chemicals for gargles, especially the mixture so commonly used, water, acholol and listerin. Healing followed when the remedy was discontinued.

8. After three repeated uses of the suspension apparatus within the same number of days, there resulted a superficial lesion of the tongue, especially on the side near the floor of the mouth. It healed without any trouble.

The borderline cases of thyroglossal ducts and ranula, as well as lesions of the mouth, buccal cavity and throat in which the tongue becomes affected, I will purposely omit reporting, since they are not within the domain of tongue diseases. I wish to further state I have carefully avoided duplication in reporting my cases and have only transgressed this rule when the instance was of particular value, as in carcinoma.



Fig. 1.—Lingua scrotalis.

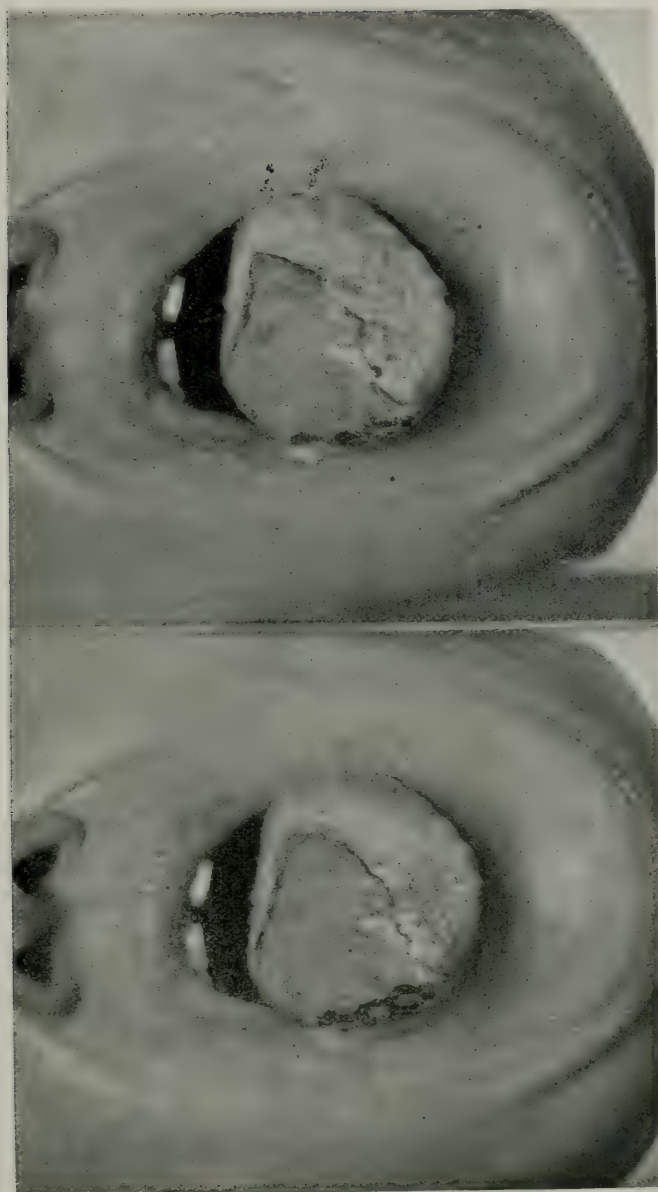


Fig. 2.—Radium burn of the tongue.

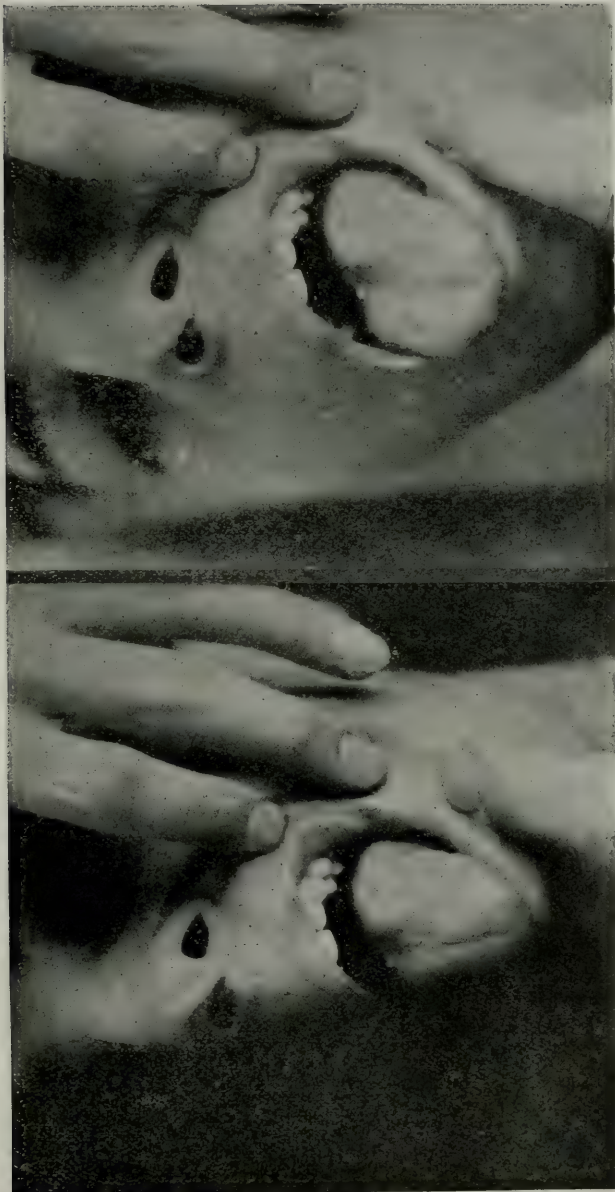


Fig. 3.—Lupus of the tongue.

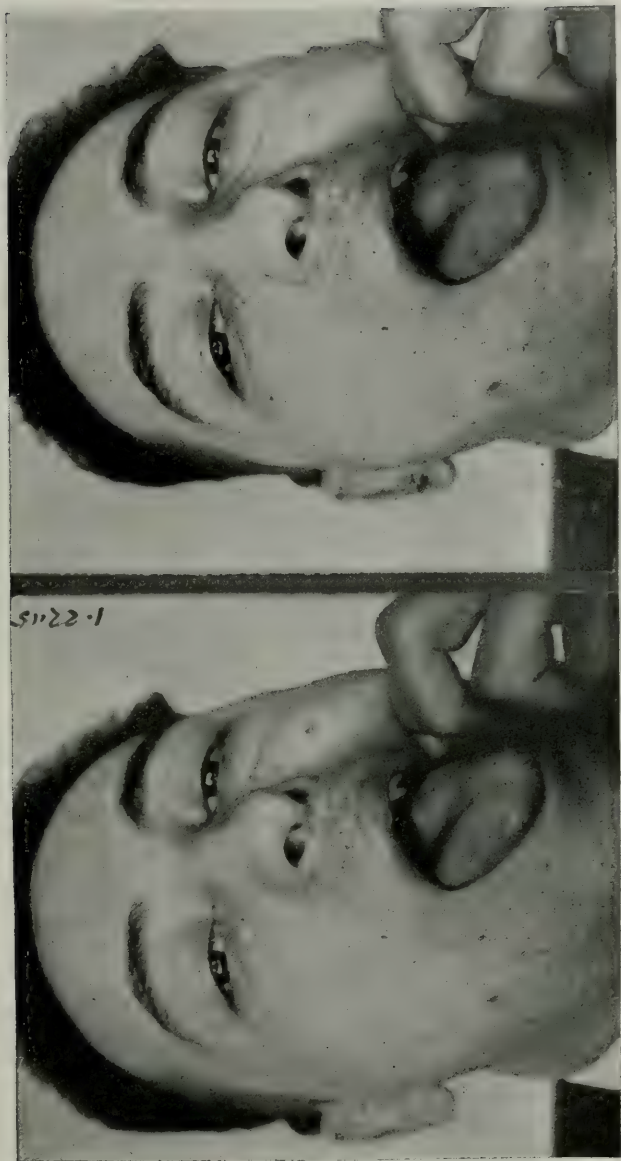


Fig. 4.—Lupus of the tongue.



Fig. 5.—Lupus of the tongue.

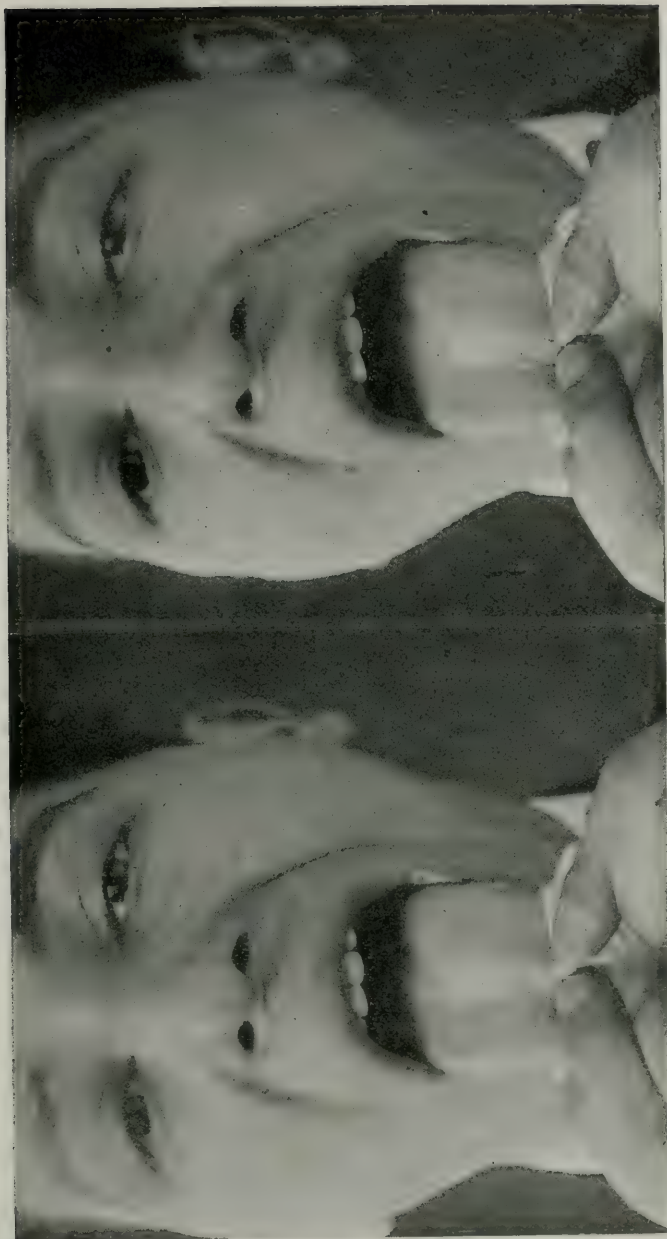


Fig. 6.—Lupus of the tongue.



Fig. 7.—Lupus of the tongue.



Fig. 8.—Lupus of the tongue.



Fig. 9.—Lupus of the tongue.

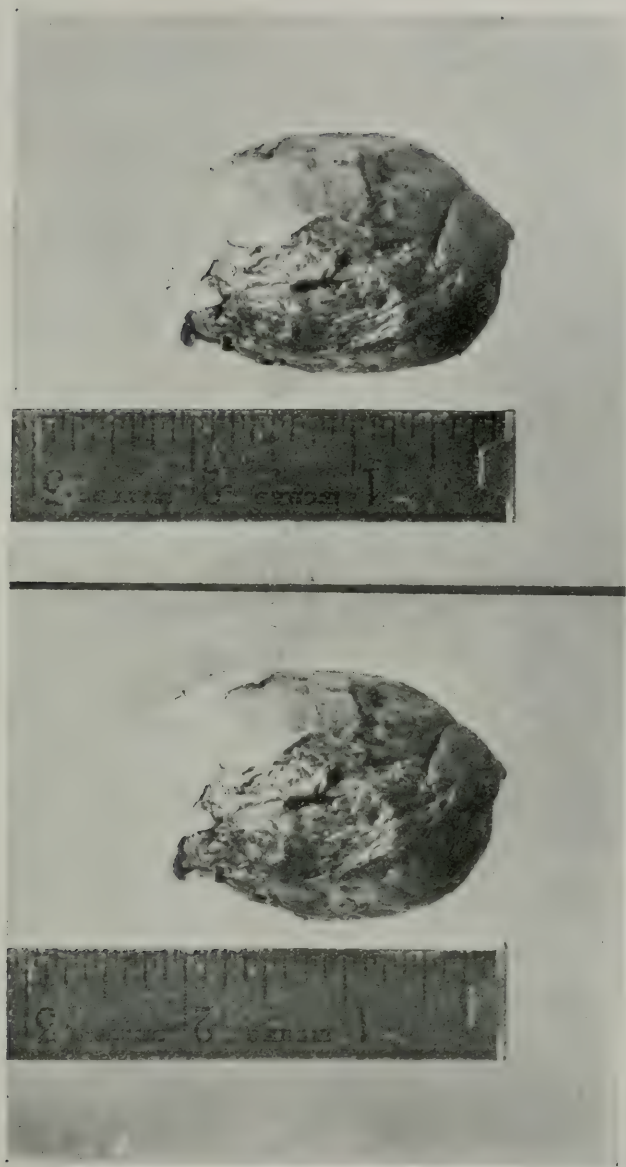


Fig. 10.—Thyroid gland at base of the tongue.



Fig. 11.—Carcinoma of the tip of the tongue. Sequester of the alveolar process.

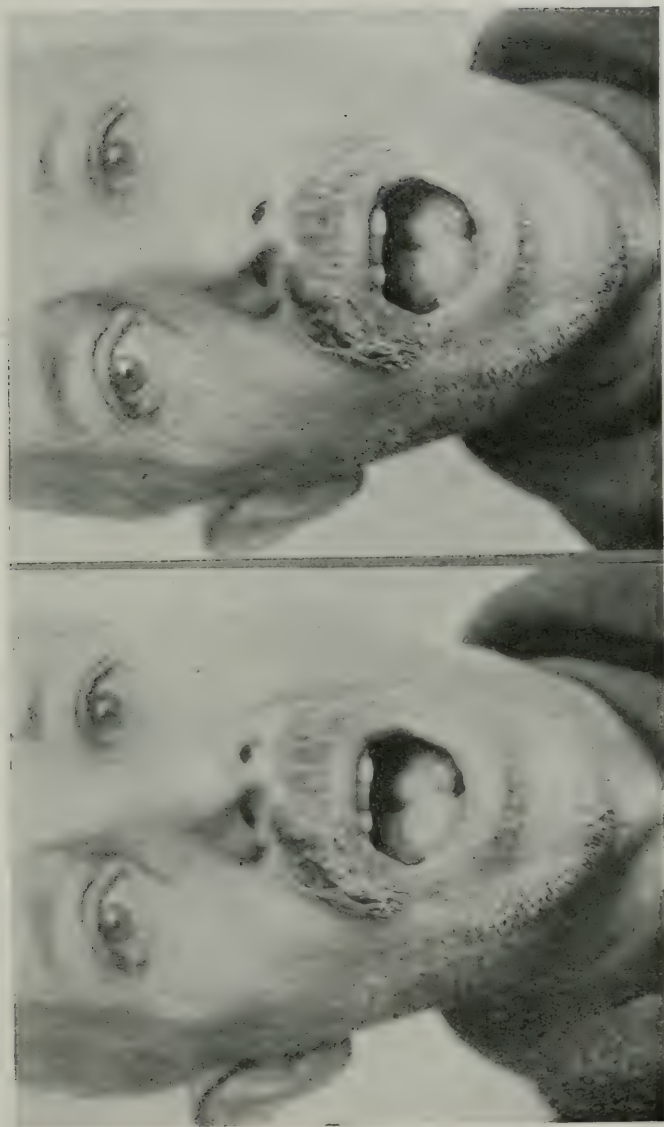


Fig. 12.—Carcinoma of the tip of the tongue. No recurrence three months after operation.



Fig. 13.—Carcinoma of the tip of the tongue; secondary gland involvement.



Fig. 14.—Carcinoma of the side of the tongue.



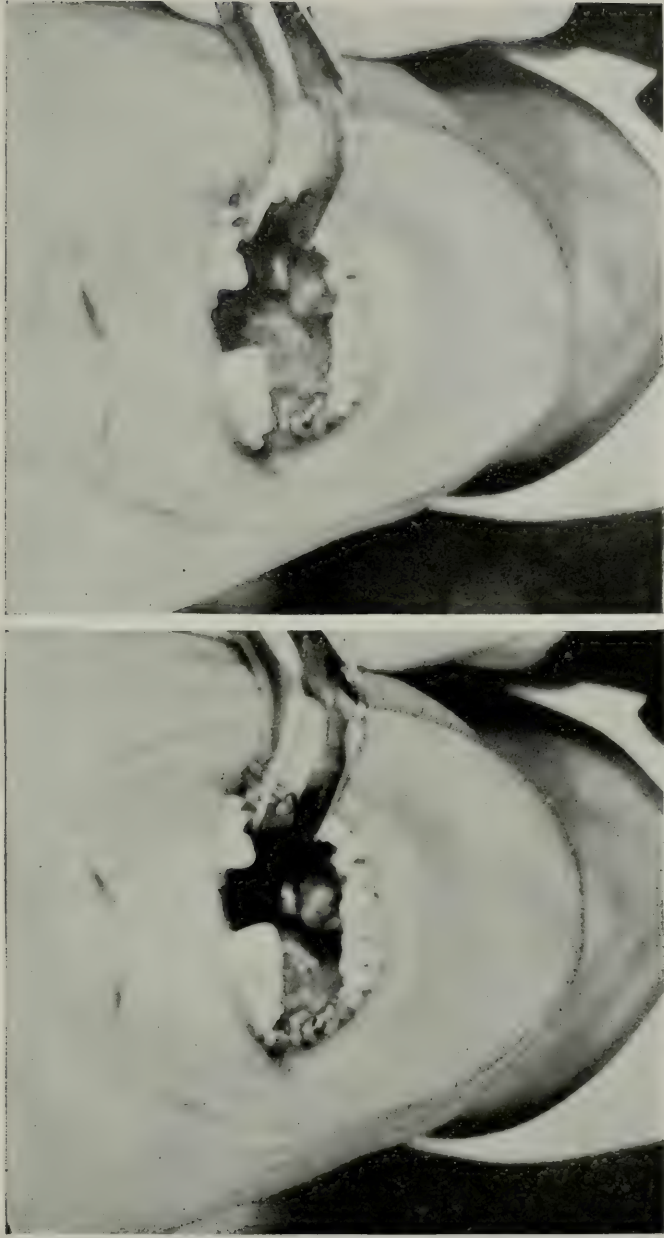


Fig. 15.—Carcinoma of the tongue, tonsil and floor of the mouth, including glands of the neck. (After operation.)

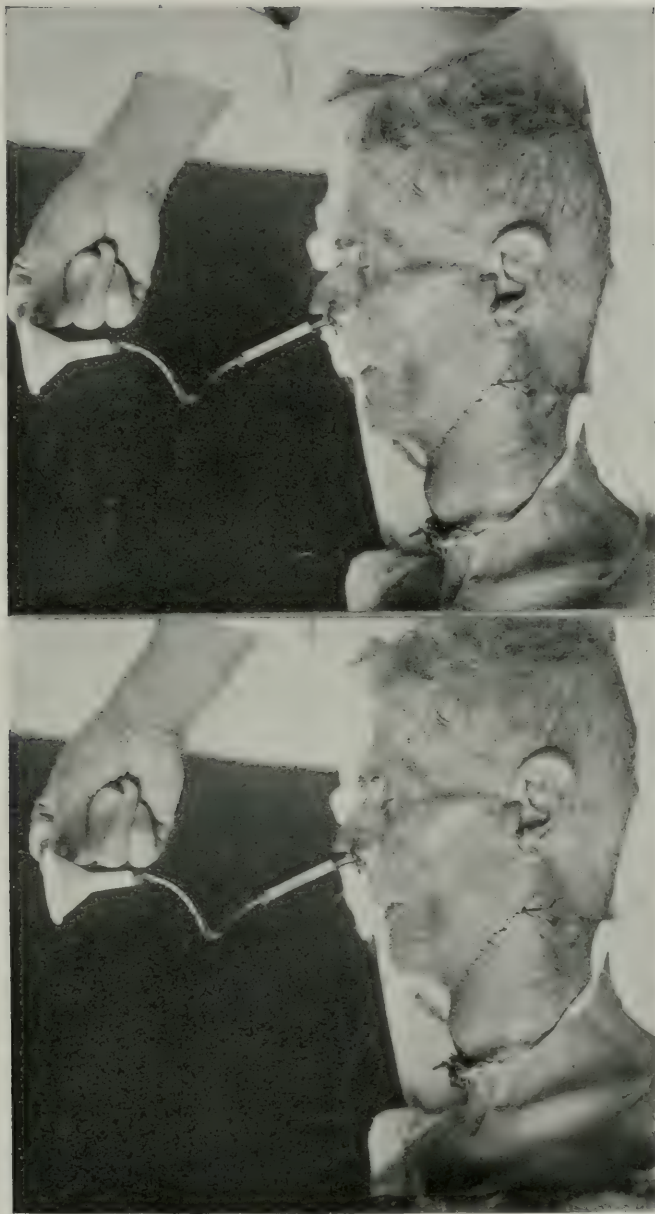


Fig. 16.—Carcinoma at the base of the tongue; postoperative; feeding the patient.

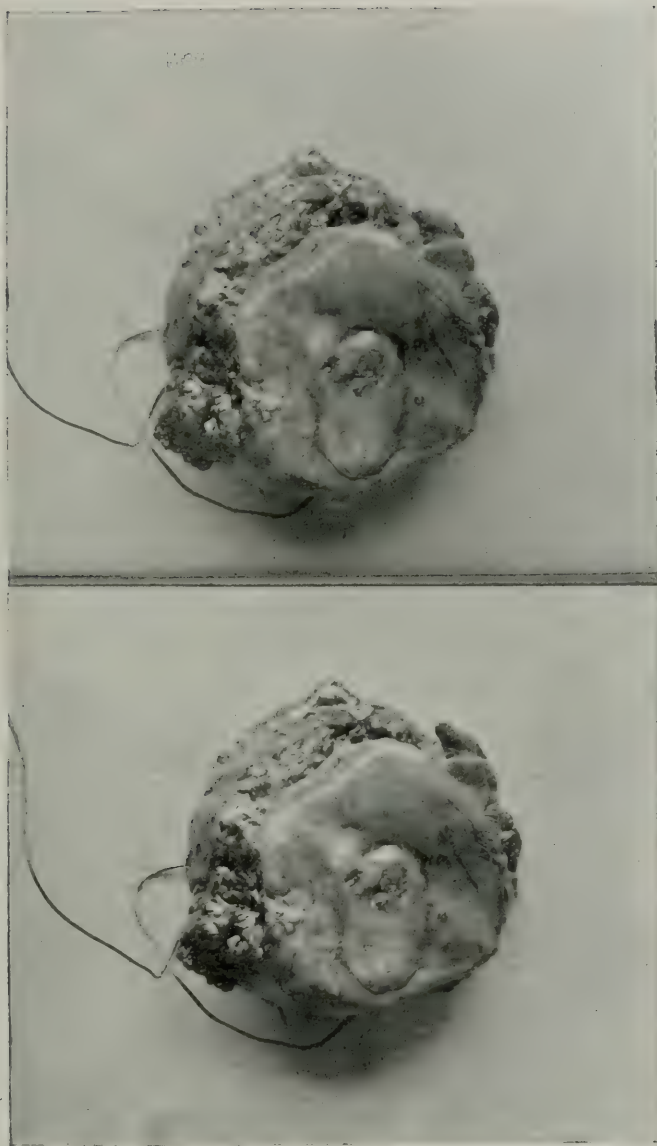


Fig 17.—Neoplasm removed. Face of the epiglottis.

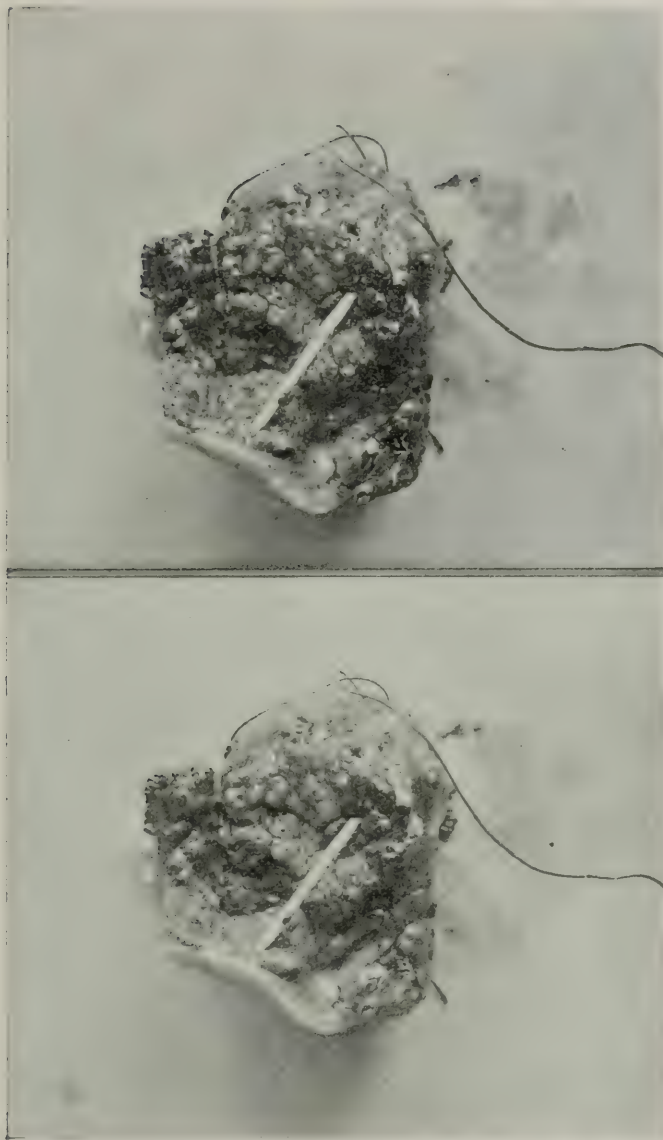


Fig. 18.—Ulceration of neoplasm. Valvular region.



Fig. 19.—Angioma of the tongue, involving the floor of the mouth.

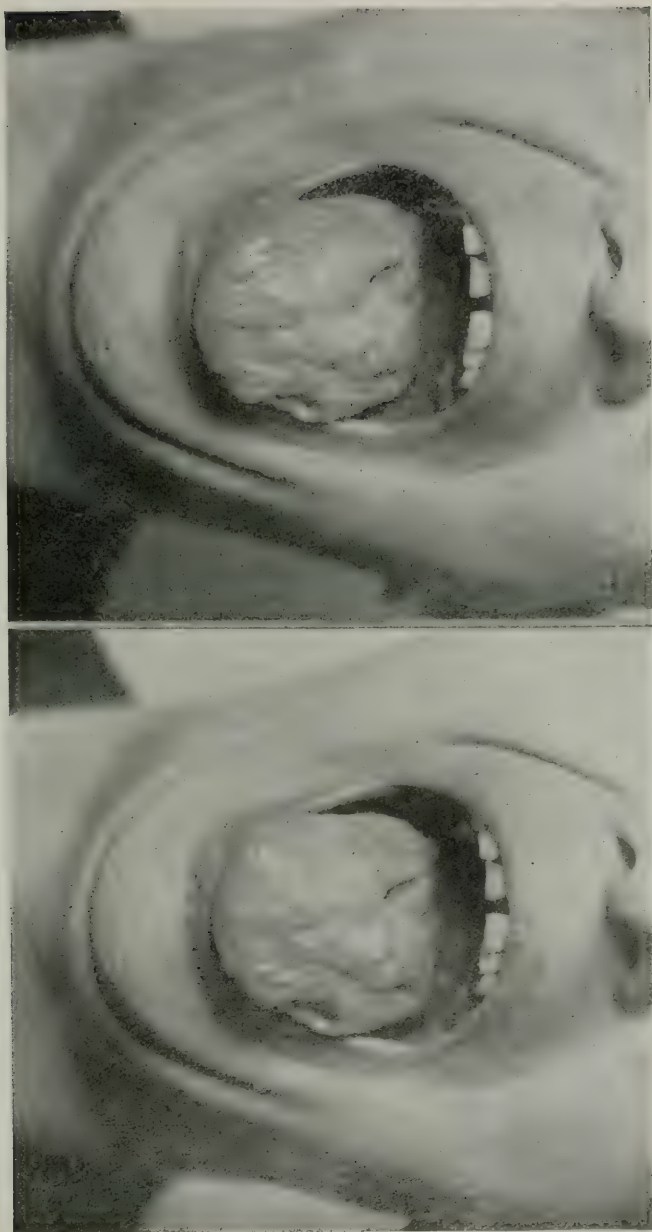


Fig. 20.—Syphilis of the tongue. (Mistaken for cancer.)

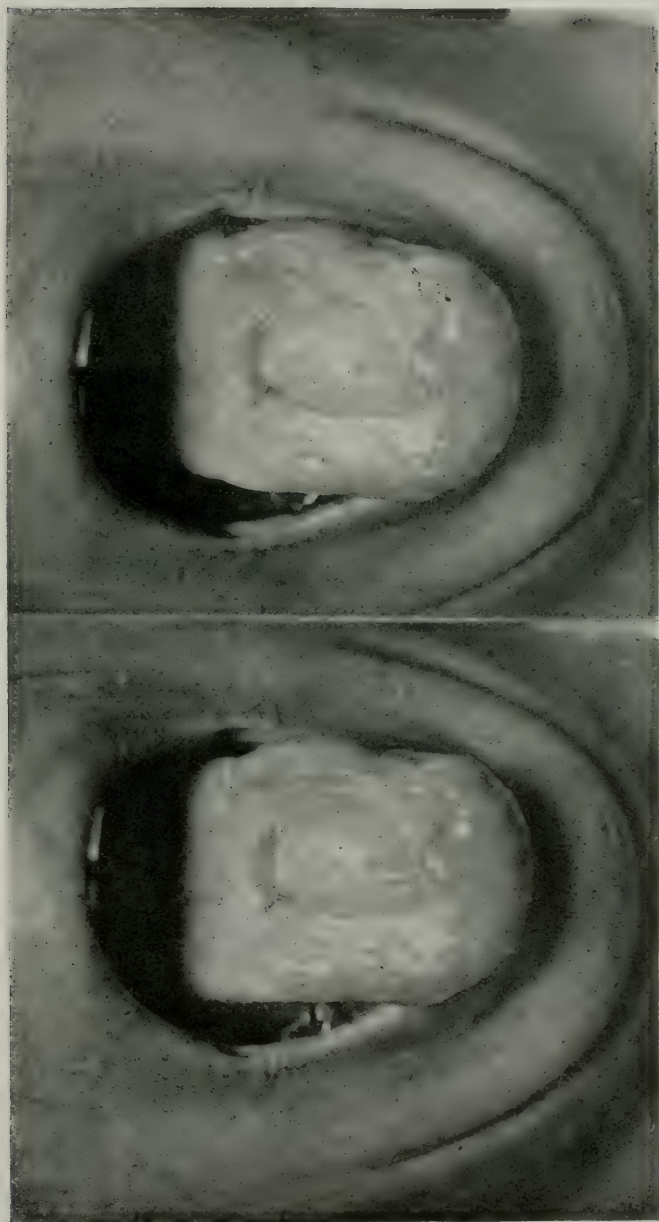


Fig. 21.—Syphilis of the tongue, healed.

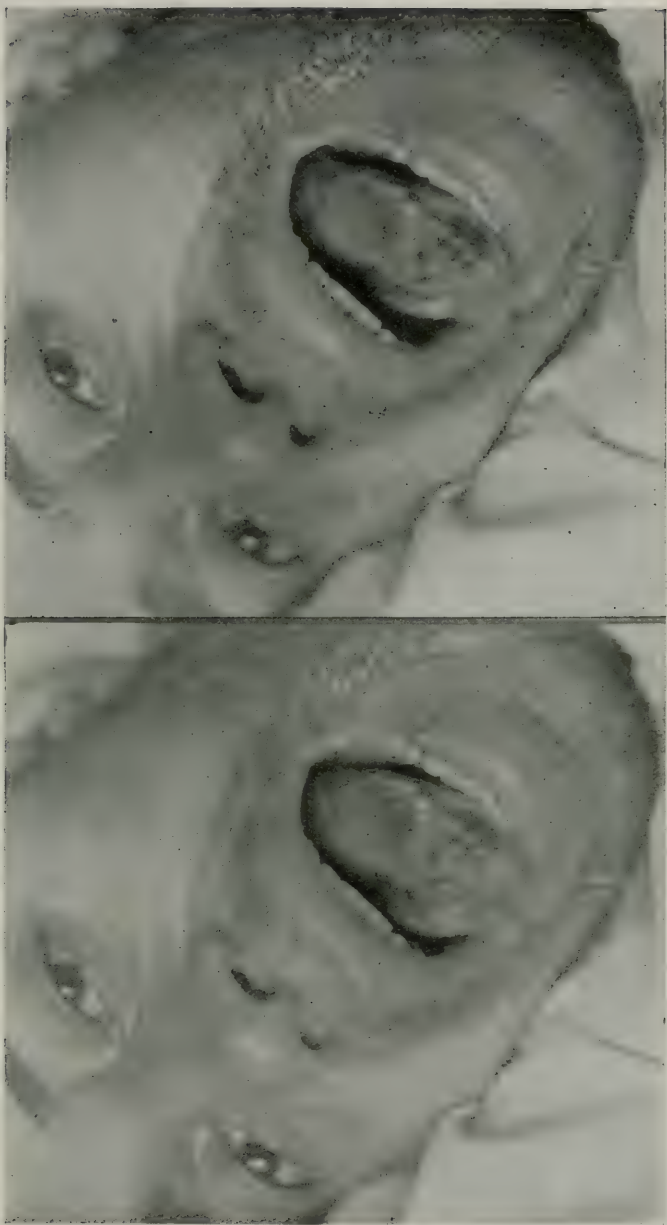


Fig. 22.—Tongue in acute lymphatic leukemia.

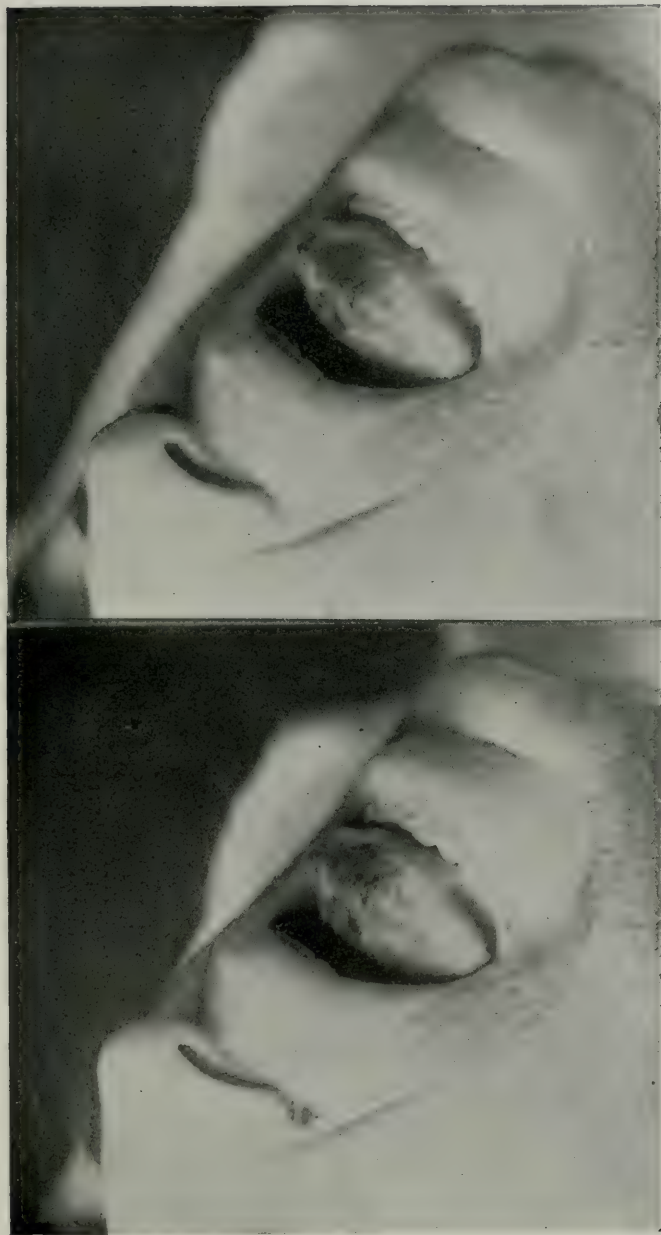


Fig. 23.—Tongue in acute lymphatic leukemia.



Fig. 24.—Progress of case of acute lymphatic leukemia of the tongue.



Fig. 25.—Further progress.

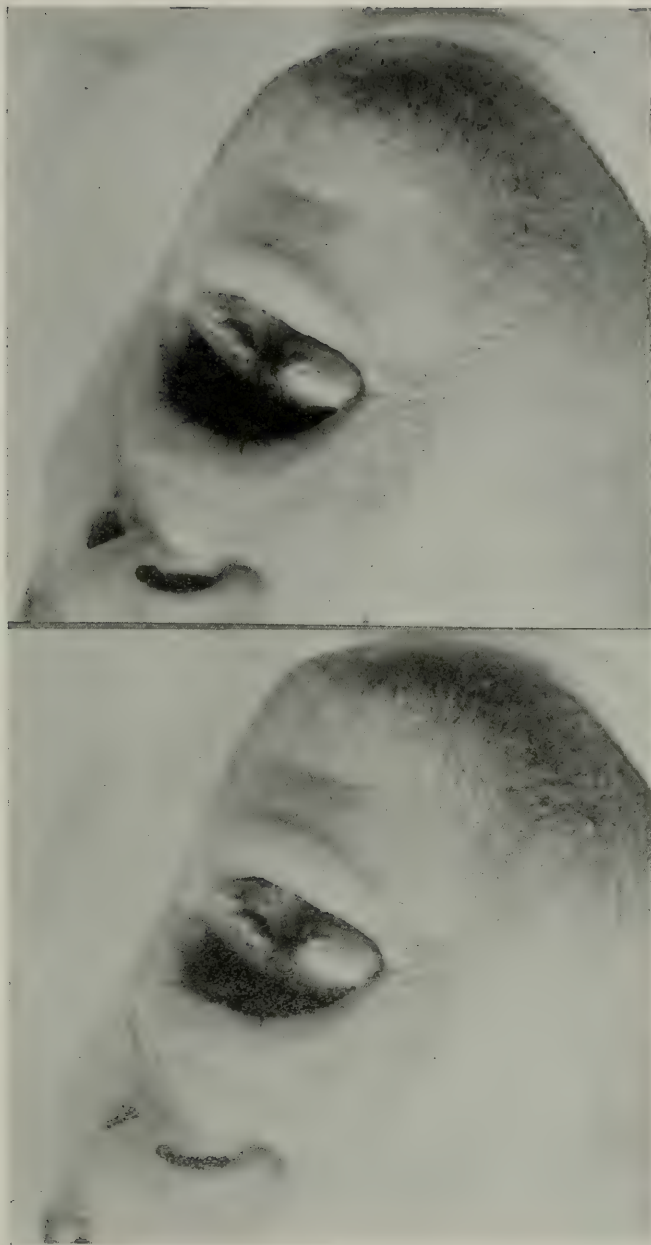


Fig. 26.—Still further progress.

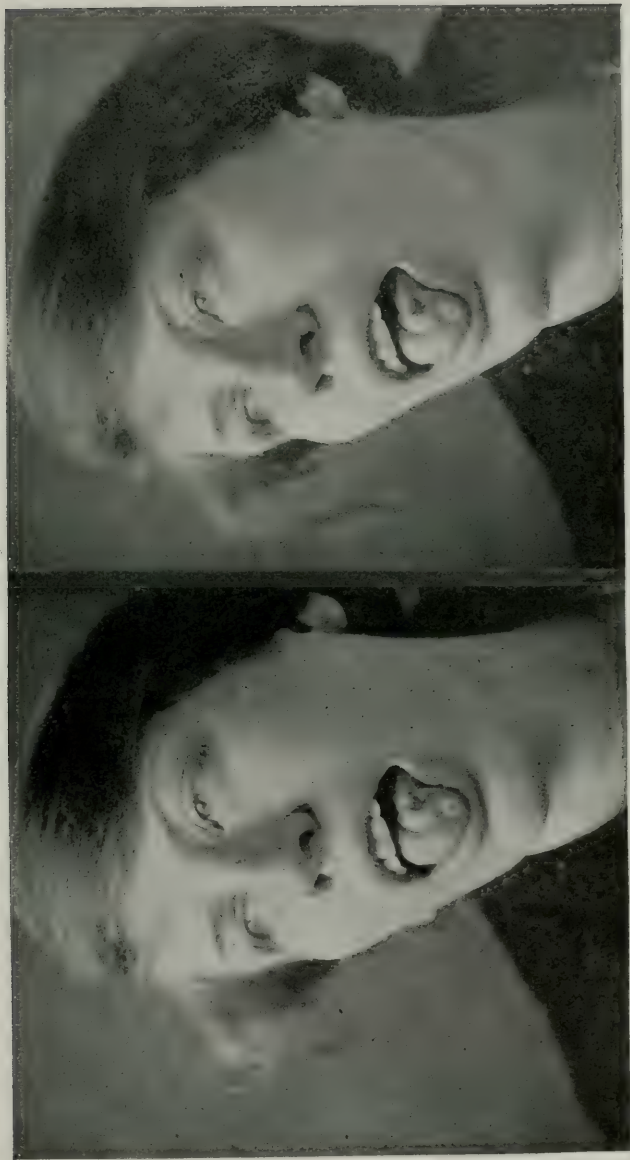


Fig. 27.—Unilateral paralysis of the tongue.

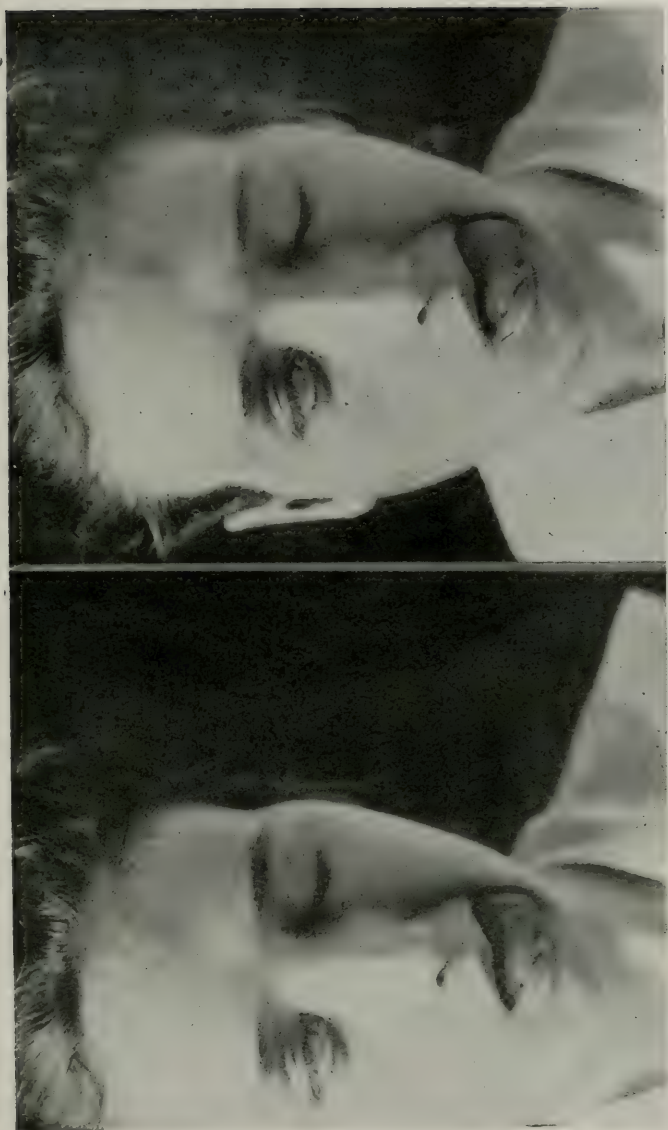


Fig. 28.—Unilateral paralysis of the tongue.

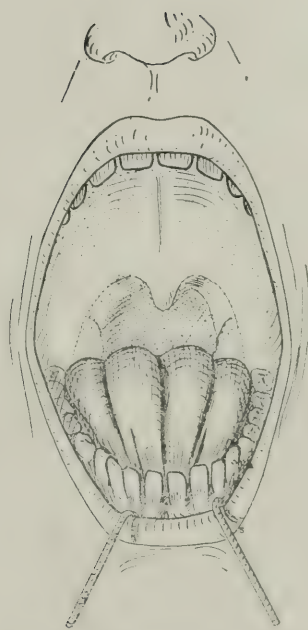


Fig. 29.—Bilateral paralysis of the tongue.

III.

THE SUSCEPTIBILITY TO INFECTION MANIFESTED BY THE REMAINS OF INCOMPLETELY REMOVED TONSILS.*

BY HANAU W. LOEB, M. D.,

ST. LOUIS.

Much discussion, verbal and written, has been ventured on the influence of the tonsil in arthritis, nephritis, endocarditis, and kindred processes. In most instances, the tonsil is brought to the bar for indictment and the punishment is assessed on the basis of the utter hopelessness of its conserving any useful purpose whatsoever.

In reference to the remedy, the tonsillectomists have fairly routed the tonsillotomists, as there has been little difficulty in establishing the insufficiency of tonsillotomy. With this phase of the subject this paper is not concerned; it is rather an effort to justify absolute tonsillectomy by showing what may result when the operation is incomplete. In other words, the determination of the operator to perform a tonsillectomy by no means assures an entirely complete operation. This may be due to a number of causes.

1. The operator's technic may be poor. He may make a stab at one of the numerous operations and may leave a fair portion remaining. He may make several attempts at forcing the tonsil through the ring and content himself with the small portion which he happens to snip away. He may undertake a dissection operation and through faulty technic or carelessness fail to remove all of the tonsil.

2. Operative accidents may interfere with the complete removal of the tonsil. Thus, the presence of hemorrhage may hide the portion of the tonsil that remains. This is a common cause to which may be added the timidity of the operator to proceed with any further operative manipulation when the hemorrhage is severe. When the dissection does not uncover

*Read before the American Laryngological Society, May, 1917.

the entire tonsil, the operator may be unaware of the presence of the hidden portion. This is particularly to be noted in connection with the upper pole of the tonsil which often requires a careful dissection to reveal. On the other hand, the lower pole may escape attention by reason of the failure to depress the tongue sufficiently.

3. The very general feeling that if the bulk of the tonsil is removed, the remaining tonsillar tissue will atrophy or, in some pleasing but indefinite way, disappear altogether. This encourages the operator to desist in his work even if it is incomplete—a not uncommon occurrence. However, experience has demonstrated, to me at least, the utter fallacy of this particular premise. If a portion of the tonsillar lymphoid tissue is left after operation, especially if it happens to contain a crypt, it is very much inclined to persist in statu quo. It may never occasion any unpleasant result, but it is present nevertheless with its susceptibility to infection, reduced though it may be. What is considered an atrophied tonsil usually signifies that the tonsil tissue has become somewhat more covered by the anterior pillar and has in part simply disappeared from view.

From the foregoing it will be readily seen that in view of the great popularity of tonsillectomy, there must be a not inconsiderable number in which tonsillar stumps remain even in the practice of the most experienced operators. It is strange, therefore, that there have been so few reports of infection originating in such tonsillar remains.

Crowe, Walker and Rotholz called attention to eight cases of infectious arthritis occurring in the remains of the tonsils after incomplete tonsillectomy. In these cases it was found that the orifices of the crypts had been narrowed, thereby mechanically favoring the occurrence of a general infection. The same authors claim that harmless hypertrophied tonsils may, in this manner, be made susceptible to the influence of general infections.

I myself have met with a number of very interesting cases that bear upon this subject, some of which have occurred after incomplete tonsillectomy performed by me and some by others.

Case 1.—Miss W., nurse, aged eighteen, in April, 1913, was taken with an acute tonsillitis, followed by mild arthritis in

both ankles and one knee joint. Recovery was fairly rapid. There was a history of previous attacks of acute lacunar tonsillitis, but so far as could be ascertained there had been no joint involvement. Her tonsils were removed on May 15, 1913. However, on one side (Fig. 1) there was a small mass of tissue which remained after the operation. Subsequent to this time she had several mild attacks of acute tonsillitis in this small mass remaining, accompanied with acute arthritis and endocarditis. The little mass was removed on June 27, 1914, and since that time there has been no recurrence whatever of the arthritis or endocarditis.

Bacteriologic examination after the first operation showed gram negative staphylococci from both tonsils and no other organisms. From the second specimen there were found diplococci, streptococci and staphylococci.

Case 2 was very similar to the one just reported, with the exception that the patient suffered from endocarditis in addition to arthritis previous to the tonsillectomy. The mass that remained was slightly larger as shown in Figure 2. The first operation was done February 3, 1915, and the second operation April 28, 1915.

Staphylococci were found in both tonsils, and on the left side there were bacilli which grouped like Klebs-Loeffler, but were somewhat thicker and showed a negative Neisser. No streptococci were present.

Case 3 is particularly interesting. Dr. W., aged forty-three, had had a tonsil operation performed in 1898, for the relief of recurring peritonsillar abscesses. After the operation he had had but few attacks. On April 23, 1913, the remains of both tonsils were removed, with the exception of a minute crypt as shown in Figure 3. In February, 1916, this small mass became acutely inflamed, and within a day or so there followed a severe attack of acute arthritis, involving both knees and both ankles, accompanied by acute endocarditis. The attack lasted for over two months: the case is here reported because of the evident relation which existed between the minute remains from the incompletely performed tonsillectomy and the polyarthritis.

Case 4.—A. L. was taken with a very acute and rapidly progressing tonsillitis early in September, 1914, more marked

on the right side. When I was called to see the patient on September 11th, I found that a gangrenous process had already set in, and in addition to the sepsis, he suffered from fairly severe hemorrhages several times a day. Examinations showed a streptococcal infection, with an added Vincent's angina. After very careful attention, he recovered, and on October 22, 1914, I removed both tonsils, completely I thought. As the case went on to resolution, I discovered a single crypt with tonsil tissue equalling a wheat grain in size, on the right side. Since that time, less than four years, he has had six attacks of an acute infection in this crypt, accompanied by pains in the joints, slight nephritis and general depression, all of which leave as soon as the minute abscess which forms is opened.

Case 5 (in the practice of my associate, Dr. Westlake).—V. S., aged twenty-one, had had several attacks of tonsillitis, one of which accompanied by arthritis, occurred two years previously. The patient when first seen, on March 20, 1916, was suffering from a severe attack of polyarthrititis, which had been preceded by tonsillitis. Tonsillectomy was performed during the attack on March 27th. The arthritis at once subsided, but she returned three weeks later with a sore throat and soreness in the left ankle. A small stub of the lower pole of the left tonsil, which had been overlooked, was found inflamed. This was removed, and up to the present time, she has no other arthritis symptoms.

These cases definitely show that small masses of tonsil tissue overlooked, or at least not removed at the operation, are susceptible of infection with remote effects similar to those which follow acute tonsil infections.

They must have their counterpart in the practice of other laryngologists, and from my own experience, must be common enough to constitute a fairly definite clinical entity.

They present a decisive argument against any form of operation which does not contemplate the entire removal of the tonsil, especially where there has already been some infective processes originating in the tonsil.

They suggest the advisability of following up cases of tonsillectomy to determine whether any portion remains and whether it has become a focus of infection.

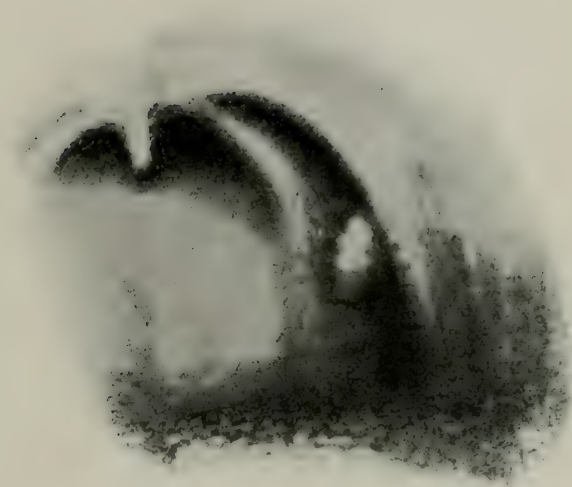


FIGURE 1.

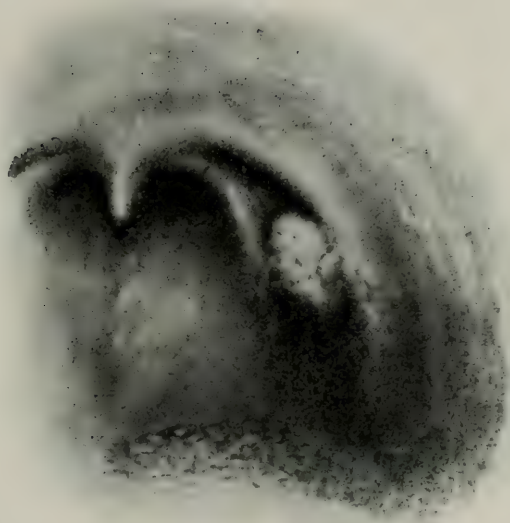


FIGURE 2.

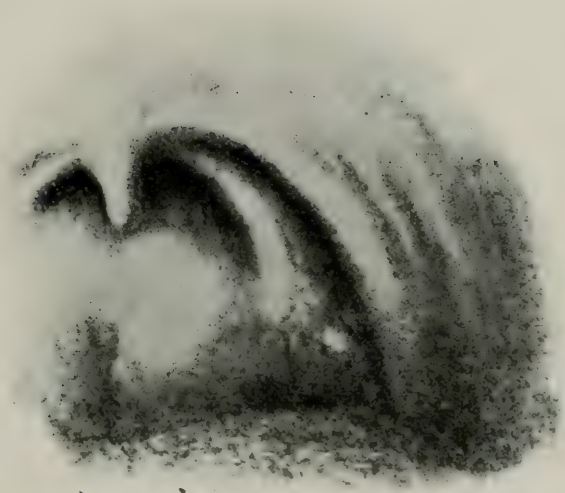


FIGURE 3.

IV.

A METHOD OF MEDICATING EUSTACHIAN BOUGIES.

BY LEE M. HURD, M. D.,

NEW YORK CITY.

The eustachian bougie has been advantageously used for over thirty years to dilate tubal stenosis and to stimulate the lining membrane. Feeling the necessity of medicating the tube at the time of bouginage, several methods have been advanced.

First.—Dipping the bougie into an aqueous solution of silver or iodine. The disadvantage of this method is that the medicament does not stick to the bougie, being rubbed off either in the catheter or at the mouth of the tube.

Second.—Coating the bougie with a heavy base, such as lanolin. This again is as easily rubbed off as the aqueous solutions.

Third.—The use of a wire bougie, such as a Holmes or a Yankauer, wrapped with cotton. This is a much better method, but with the disadvantage that a considerable portion of the solution into which the bougie has been dipped is squeezed out as the bougie advances into the tube, as well as the difficulty of properly adjusting the cotton on the bougie to the size required for the particular tube in question.

The simple method which I have used for fifteen years has the advantage of placing the drug used where you want it, and on the exact size of bougie you wish in the particular case. Celluloid bougies are used, which are coated with silver nitrate, using gum acacia as a base.

Method of Preparation.—In a narrow test tube, make a saturated solution of gum acacia in a water bath, then add the silver nitrate solution from one per cent to ten per cent of the silver as desired. The bougie is dipped about one and one-half inches into this solution, and when the bougie has a uniform coating, it is placed to dry, and then I usually give the bougie a second coating. When dry, the gum acacia and silver

coating looks and feels like varnish to the dry fingers. The silvered bougies can be made up in quantities, and when kept dry, will last fairly well for a week or more.

The one disadvantage of using bougies several days old is, however, that the silver nitrate will gradually oxidize, so that the coated bougies, a week or more old, may have lost half of their silver nitrate per cent. I generally use them the second or third day after preparing them.

Method of Introduction.—A plain gum elastic or celluloid bougie, of the proper size, is passed through the tube to make sure of the position of the catheter, and the size of the bougie the tube will admit, and also to dilate the tube, then the plain bougie is withdrawn and the coated bougie can be readily passed as far as desired and remain there about two minutes to allow the moisture from the membrane to dissolve the gum and deposit the silver where desired, knowing that a definite per cent of the silver nitrate has been deposited. When the bougie is withdrawn, the gum coating will be entirely gone, or only a little stickiness will be felt.

The pathology of the tubal mucosa is practically the same as that of the nasal pharyngeal mucosa, acute congestion, chronic hyperplasia, chronic hypertrophy, etc.

The vast majority of tubal stenosis will readily yield to the use of the unmedicated bougie, but some cases of hyperplasia and hypertrophy relapse to their former condition, and the plain bougie fails, then the bougie varnished with gum acacia and silver nitrate will reduce the swelling.

Results.—One or four per cent is usually strong enough to contract the membrane, if not, the strength can be increased up to ten per cent. The stronger per cents should be used cautiously if it is necessary to pass the coated bougie beyond the isthmus, as several times I have produced a serous exudate which drained into the tympanum, producing tinnitus and diminishing the hearing for several days.

I have never had pus form in the middle ear, nor had to incise the drum membrane for the relief of the exudate.

The weakened silver nitrate per cents produce no discomfort, but sometimes the stronger per cents will give annoyances and

also cause some pain, referred to the ear, similar to the discomfort produced in the nose by ten per cent of silver nitrate.

Ultimate results naturally vary. Some tubes remain perfectly patent, while others relapse after a time, and require a repetition of the treatment.

15 East 48th Street.

V.

TO DETERMINE THE LOCATION OF THE LATERAL SINUS FROM EXTERNAL MARKINGS. ALSO, THE APPROACH TO THE MASTOID ANTRUM, AS MODIFIED BY SURFACE MARKINGS.

BY H. J. PRENTISS, M. D.,

IOWA CITY, IOWA.

Lateral Sinus Determination.—This may be approximated by determining the position of the supramastoid crest—i. e., third root of the zygoma. The supramastoid crest probably is developed along the lateral suture line, between the squamosa and petromastoid bone (Figures 1 and 2). The reason is that the temporal muscle, in part, arises from the squamosa, and so, due to the tug of this muscle, at this suture line apparently is developed the crest. This suture line determines the position of the anterior superior surface of the petrosa, and therefore the supramastoid crest does the same thing (Figures 3 and 4).

If the supramastoid crest changes its course markedly from that of the zygomatic arch, so that it runs obliquely upwards (Figure 5), it indicates that the anterior superior surface of the petrosa is approximating the vertical, rather than the horizontal plane, and therefore the same is true of the posterior superior surface of the petrosa. If, conversely, the supramastoid crest continues backward the line of the zygomatic arch, so that it approximates the horizontal (Figure 6), it indicates that the anterior superior surface of the petrosa is approximating the horizontal rather than the vertical. The same is true of the posterior superior surface. In the first case the lateral or transverse sinus, in making its turn at the sigmoid groove, on the posterior superior surface, only encroaches slightly, because of the high placed surface (Figure 5). In the second case the sinus has to encroach markedly on the bone,

to make the turn, so as to keep the lumen of the sinus intact (Figure 6).

Therefore, a very obliquely placed crest indicates that the sinus is well posterior to the field of approach to the antrum (Figure 5), and a horizontally placed crest indicates that the sinus is close to the field of operation (Figure 6). (See X-ray pictures.)

Modifications.—The external auditory meatus varies. It may run in from the cortex at a very oblique angle, running inwards and forwards, or it may run at a right angle to the cortex. In the first case, since the approach parallels the meatus, it keeps away from the sinus (Figure 8). In the second case it approaches the sinus (Figure 7).

Again the lateral sinus on one side may be small. Here the danger of exposure of the sinus is lessened.

Variations in Approaching the Antrum.—The antrum is in the horizontal plane with the attic, and therefore is above but posterior to the upper wall of the external auditory meatus. This relation does not vary. What does vary is the depth of the middle cerebral fossa. We have seen that the supramastoid crest indicates the petrous portion of this fossa. This crest varies in its position to the external opening of the external auditory canal. It may run backwards well above this canal, or run backwards just tangent to the canal (Figures 9 and 10). In the first case (Figure 9), the cone of approach may be made with little likelihood of exposing the meninges. Here we do not have to consider the triangle of election or McEwen's triangle, but can cut away the bone above the crest, owing to the inner table shelving away.

In the second case (Figure 10) the approach must be made well below the crest and even in the horizontal plane of the meatus. The apex of the cone of approach, however, must always point upwards to reach the antrum which, as has been pointed out, is above but posterior to the meatus. If we went horizontally inwards we would miss the antrum, but hit the vertical part of the seventh cranial nerve, which as is known turns downwards in the floor of the aditus.

The position of the antrum in the low placed crest may be emphasized by making a horizontal line a trifle above the meatus and backwards. The depth to the antrum may be

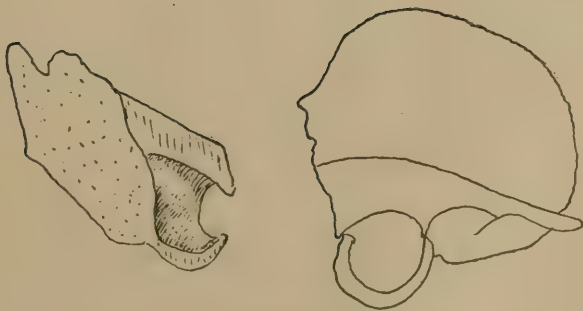
determined by ascertaining the depth of the meatus. The distance to the antrum cannot exceed the depth of the meatus, as the middle ear approaches the cortex as it passes backwards (Figure 11).

Any temporal bone may present all combinations of these variations.

This department has two cases of impossible approach to the antrum via the cortex. Here the temporal fossa reaches so far backwards and the sinus so far forwards, that the petrous bone between the antrum and the cortex presents a thin plate of bone, so that the operator will immediately expose the fossa or sinus, or both.



FIGURE 1.



• FIGURE 2.

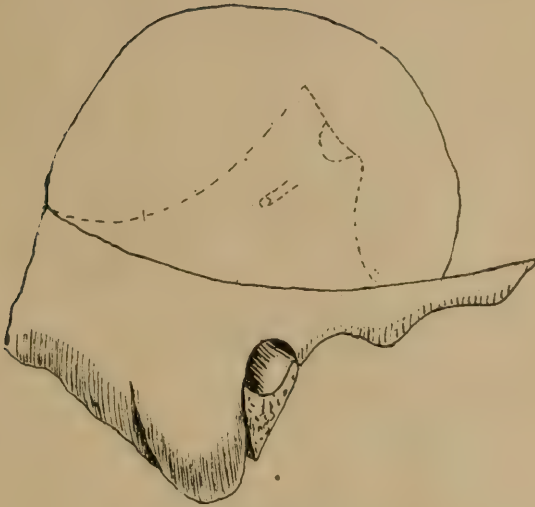


FIGURE 3.

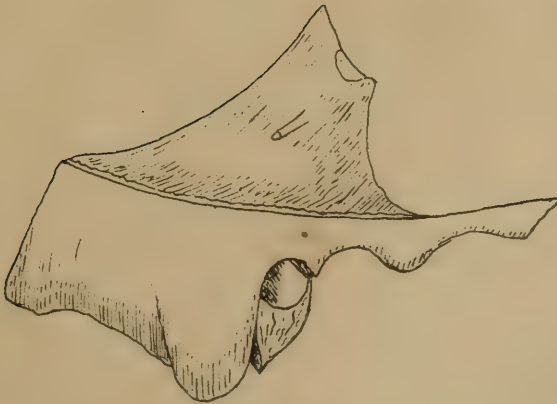


FIGURE 4.



FIGURE 5.



FIGURE 6.

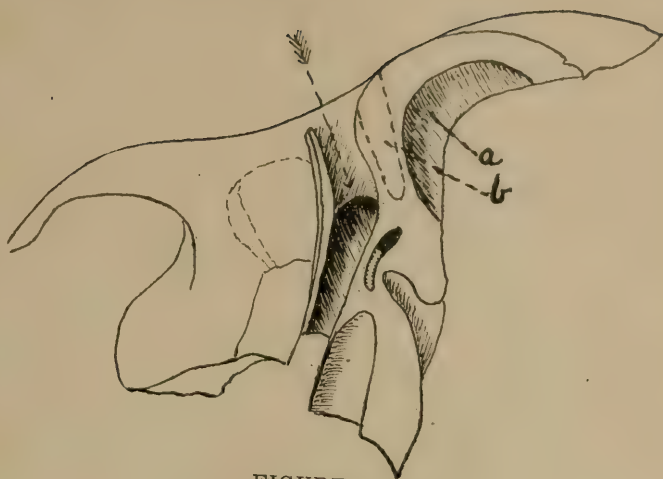


FIGURE 7.

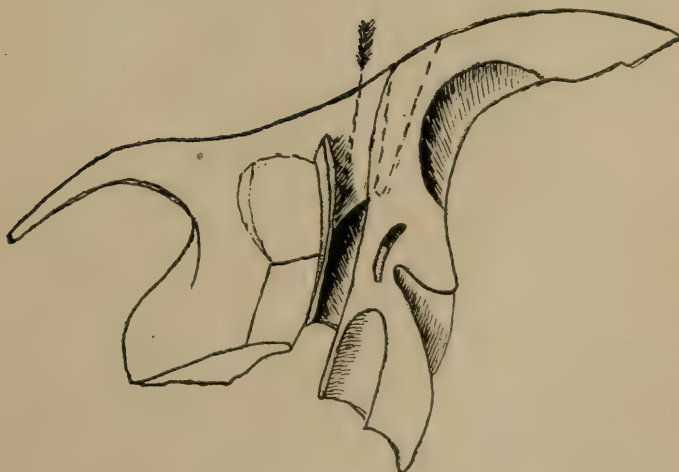


FIGURE 8.

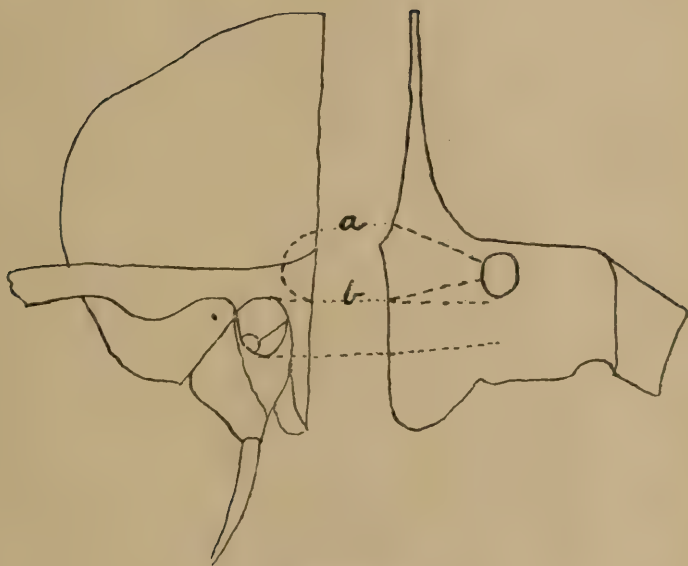


FIGURE 9.

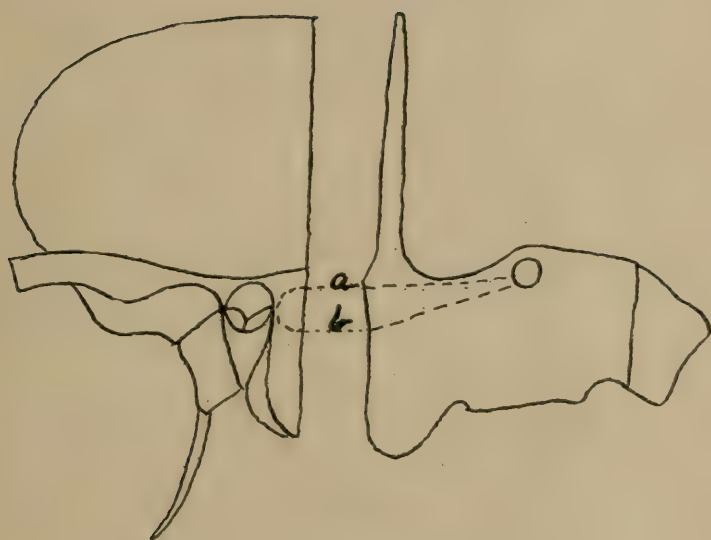


FIGURE 10.



FIGURE 11.

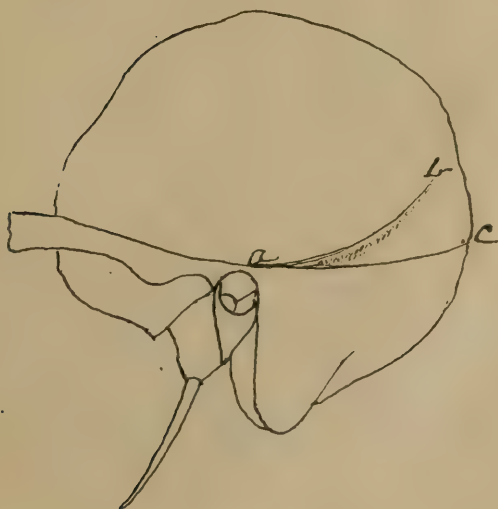


FIGURE 12.



FIGURE 13.

VI.

THE OCCURRENCE OF NODULES OF CARTILAGE IN THE TONSIL.

BY JONATHAN FORMAN, M. D.,

(FROM THE LABORATORY OF PATHOLOGY OF THE OHIO
STATE UNIVERSITY),

The occasional occurrence of small islands of cartilage and bone in the tonsil has been reported by a number of observers.

In the majority of instances the bone was thought to have developed from the cartilage. As to the origin of the cartilage, two main theories have been advanced. The first theory explains the presence of the cartilage as having developed from the stimulation and growth of a fetal rest or misplacement. This agrees with the fact that this cartilage appears in a region wherein the embryo cartilage is very abundant. The second explanation is that cartilage is developed from the connective tissue by metaplasia. It is thought that this transformation is brought about by the presence of an inflammatory process.

For an excellent review of the literature and a resumé of the evidence for these two theories, the reader is referred to the recent paper by Cary.¹

Maclachlan⁷ in careful and painstaking study of over three hundred and fifty pairs of tonsils collected at Mercy Hospital of Pittsburg, found eleven specimens containing cartilage. Reitman,¹¹ in a series of fifty cases which included all ages, found cartilage present in the tonsil in thirty-four per cent. Ruckert¹² obtained about the same percentage in infants. Lubarsch⁶ found islands of cartilage in sixteen per cent of four hundred and twelve cases. This year in the examination of two hundred and ninety consecutive pairs of tonsils in this laboratory, only one specimen was found to contain cartilage. This is a much smaller percentage than those given above. Still, judging from the extent of this literature, it

may not be an unusual series on this account. The percentage of tuberculosis in this series is low—approximately 0.5 per cent. Lubarsch's series contained a goodly number of tuberculosis. MacLachlan found cartilage associated with tuberculosis in two of his eleven specimens. Possibly this is a factor at work in our series.

Our specimen occurred in a girl aged fourteen who gave a history of chronic tonsillitis. The right tonsil appeared hypertrophied. The left tonsil was somewhat smaller and was removed with greater difficulty.

There are seven distinct islands of cartilage in the connective tissue of the capsule and trabeculæ of the left tonsil. These areas of cartilage seem to blend with the connective tissue in such a manner as not to offer any suggestion of a perichondrium. There are no areas of ossification. In addition to this cartilage formation, the tonsil presents keratinization of its epithelium, the accumulation of lymphoid cells and leucocytes in the crypts and partial fibrosis of the lymphoid tissue.

The tonsil of the opposite side contains no bone or cartilage, although practically the whole organ has been sectioned serially. It presents the picture of a distinctly hypertrophied tonsil.

So far as this specimen is concerned, an explanation for the occurrence of cartilage in the tonsil would appear to be a metaplasia of connective tissue which had a certain aptitude for chondrofication. The evidence which points to the metaplastic nature may be briefly summarized as follows:

(1) There is a fibrosis of the tonsil; (2) One tonsil is alone involved, and it is the one presenting the most evidence of chronic inflammation; (3) Cartilage is found only in the connective tissue of the capsule and trabeculæ; (4) The continuity of the cartilage with the connective tissue.

Many of the specimens, however, reported by other observers do not fit so nicely into the theory of metaplasia. In fact, neither the embryonal nor metaplastic theory appear to cover all of the specimens described. The best statement of the situation would, therefore, appear to be that of Cary. The best explanation of "the origin of cartilaginous and bony nod-

ules in the tonsil and one which meets the conditions described by the various writers is that, as Ziegler expressed it, we have embryonal rests and especial chondro- and osteoplastic aptitude of the connective tissue cells in this region."

SUMMARY.

In this specimen, there is a unilateral deposit of cartilage, associated with the repair (replacement fibrosis) of a chronic inflammatory lesion, occurring in a region where embryonic rests are frequently found and where the connective tissue may have an especial chondroplastic aptitude.

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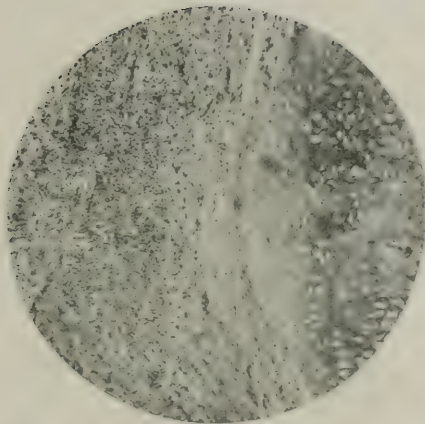


Figure 1.—Showing the fibrosis of the tonsil and the island of cartilage in the adjacent capsule.

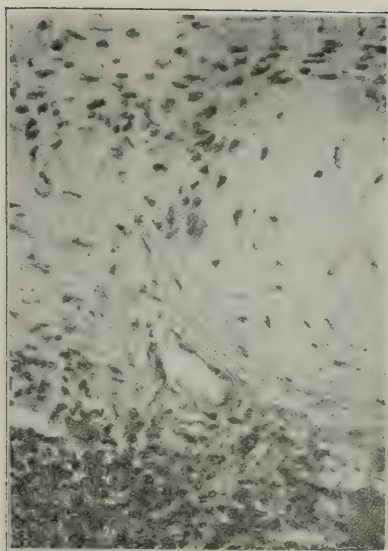


Figure 2.—Showing the blending of the cartilage with the connective tissue of the capsule.

VII.

A NEW OPERATION FOR COLLAPSED ALAE NASI.*

BY OSCAR WILKINSON, A. M., M. D.,

WASHINGTON.

The following operation I have performed in four different cases, all with perfect results, both as to cosmetics and function of the nose.

I first did a submucous resection in the middle portion of the septal cartilage, taking out as much as one centimeter square of this cartilage. This is placed in a warm saline solution and left there until needed. After thoroughly anesthetizing the lower portion of that side of the nostril to be operated upon, an incision, AB as per drawing, is made in the floor of the nose, cutting down through the muscle and well out onto the skin. From B in the drawing an incision is made up the septum through the skin down to the cartilage. This incision should be at least one centimeter long and extend to the point C in drawing.

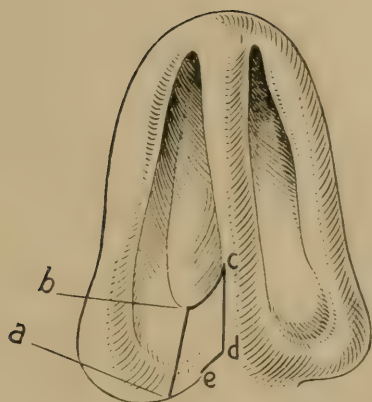
From the point C a horizontal incision is made along the septal mucosa forward to the skin surface, to the point D in the drawing. From D an incision is made to the point E. This flap is now dissected up from the line BC forwards, and this dissection should include not only the skin but the subdermal tissue.

The flap should be dissected well in advance of the letter E, so as to make it possible to turn this flap one-fourth of a turn. The line BC of the flap is now turned one-fourth of an angle around and stitched to the line AB, whereas the line CD of the flap is stitched to the line BC of the original incision.

Before drawing taut and tying the stitches the septal cartilage is taken from the salt solution, pared off with scissors to a suitable size, and inserted beneath the flap, after which the sutures are tied.

The only after defect to be noticed in this operation is the raw surface produced from D to E by turning of the flap, and the rather wide-open nostrils for the first few weeks, both of which conditions are soon relieved by the dermatization of the bare space at point D, and a slight contraction of the scar tissue.

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VIII.

REPORT OF A CASE OF PURULENT LEPTOMENINGITIS OF OTITIC ORIGIN.*

BY DANIEL LAYMAN, M. D.,

INDIANAPOLIS, IND.

I was called hurriedly on the afternoon of November 27, 1916, to see a patient in a comatose state. I was called because she was not responding to medical treatment and her physician thought the ear might have something to do with her condition. On my arrival, the only history obtainable was that Mrs. K., aged twenty-three, had been in a semicomatose state for the last three days. Her illness commenced about two weeks before with cold, followed by headache over the right side of her head. The headache became most pronounced, so intense that there was noticeable some mental disturbance. There was also a history of some nausea and vomiting.

Examination showed a well-nourished woman lying in bed comatose. She could be roused only with difficulty, and showed distinct evidence of acute, marked meningitis—temperature 103, pulse 125.

Examination of the ears showed slight moisture over both drum membranes. When wiped with a cotton probe distinct foul odor was noticeable, more marked in the right ear. Marginal perforation posteriorly, posterior superior wall bulging. On account of the meningitis and the serious condition of the patient I asked for a consultation with a neurologist to substantiate the diagnosis and consider with him whether or not an operation would be advisable. Dr. Neu was called, and his report is as follows:

"Complexion, sandy; rather fleshy; lying in bed; comatose. Patient can be roused and understands simple requests, but immediately relapses into unconsciousness, performing acts

*Read before the meeting of the Middle Section of the American Laryngological, Rhinological and Otological Society, held at Columbus, Ohio, February 26, 1917.

somewhat automatically. Skin is dry and rough; mouth dry; temperature, 103; pulse, 120; respirations, 20. Shows marked cervical rigidity; pupils reacting to light; Kernig's sign on both sides, more marked on the right. Babinsky on left only; choking of both optic discs. An unsuccessful attempt was made to withdraw some cerebrospinal fluid. Later, while on the operating table, lumbar puncture gave a fluid with greatly increased pressure, turbid, slightly greenish yellow color, with considerable cellular deposit on standing. Microscopically, the deposit consisted of mononuclear and polynuclear cells more or less degenerated and occasional diplococci, probably pneumococci."

The usual radical operation on right mastoid with an exposure and drainage of the dura in the middle fossa was determined upon, taking into consideration also surgical drainage of meninges on left side. The mastoid throughout was found sclerosed, apparently eburnated throughout, and the cells contained some pus. The exenteration was done slowly, because of the hardness of the bone and the close approximation of the lateral sinus to the antrum, which was deeply seated and small. The roof of the antrum was found necrosed and broken down, and on enlarging the opening a small epidural abscess was encountered and cerebrospinal fluid in which there was pulsation. A segment of the squamous portion of the temporal bone was removed over an area about one inch and a half by one inch to expose the dura over the temporosphenoidal lobe. There was evidence of intradural pressure and an inflamed dura, especially over that portion of the dura contiguous to the antrum tegmen. A semicircular incision was made through the dura, and drainage instituted by gutta percha drains, inserted fan-like, well up between the dura and skull, especially in the subtemporal region; i. e., beneath the dura along the petrous portion of the temporal bone. At this stage of the operation Dr. Neu made a lumbar puncture, and withdrew a creamy turbid fluid, the report of which has been given above. I did not do a radical, on account of the serious condition of the patient. The hurry-up sign was hoisted and I felt that something might go wrong in attempting fast work in a sclerosed mastoid and a lateral sinus jammed up against the

antrum, thus jeopardizing the patient's chances of recovery, as Dr. Crocket states that "every minute over fifteen minutes for this operative procedure counts materially against the patient's chance of recovery," and I had already exceeded the time limit.

Convalescence was slow; both the constitutional and local symptoms subsided gradually, with the exception of headache, which was rather severe for several days, being especially pronounced on the sixth day after the operation, when also a rise of two degrees of temperature occurred. It was necessary to change the outer dressings every day for a few days, as they were soaked with cerebrospinal fluid. The first complete dressing was made on the fourth day, but the subtemporal drainage was not removed until the second dressing on the fifth day. The patient was up and out of bed three weeks after the operation.

Dr. Neu's report of examination of patient two days after operation is as follows:

"Spinal fluid with pressure still increased, but less so than previously—clearer, transparent, slightly fibrillated clot after standing several hours; the number of cells greatly reduced. Reduced Fehling's solution, slight increased protein content. The cervical rigidity was less marked. Kernig's sign was scarcely noticeable. There was still pain in the head, mostly over the area of operation. Patient had regained consciousness. Pulse, temperature and respiration were practically normal; optic discs still showed choking, the right more than the left."

Subsequent to the operation the following history was elicited from the patient. Had recurrent discharge from ears, dating back and persisting since early childhood. Discharge from right ear had been bloody and of foul odor the last few years, and up to within a few weeks of her illness.

Careful treatment at the time of each dressing of mastoid and cranial wounds stopped the discharge from the ear altogether before the wounds were completely healed.

Cases of purulent meningitis recoveries after operation have been reported by American otologists during the last decade. However, these cures were not due to any well established and recognized method of operative procedure.

Of special interest are the series of cases and method of treatment reported by Dr. Crocket, of Boston, at the (1916) annual meeting of the American Rhinological, Laryngological and Otological Society, held at White Sulphur Springs, Va.

I tried to carry out the surgical technic as laid down by Dr. Crocket. As I had not read his report of the two cases of recovery in the transactions which had not been received, some of the details were overlooked. However, the essentials of my technic were as he had outlined—i. e., one and one-half inch opening of the dura made at the bottom of the bone opening, and insertion of the subtemporal drain along the top of the petrous portion of the temporal bone. Dr. Crocket recommends that the lumbar puncture be made previous to making the dura opening, as the amount of pressure in the brain can be gauged by the finger tip pressed against the dura, this grading the amount of fluid withdrawn.

Whenever this important subject is discussed some otologists put themselves on record as not having seen a case of purulent meningitis recover after operation. I had not, until this case, and notwithstanding the reports regarding self limitation and spontaneous recovery in diffuse purulent meningitis, I give credit for the cure of this patient to the method proposed by Dr. Crocket. I look for more favorable results in the future in the cases operated early with this improved surgical technic.

IX.

REPORT OF CASES OF BILATERAL ABDUCTOR PARALYSIS OF THE VOCAL CORDS.*

BY RALPH BUTLER, M. D.

Although these cases are not very rare, each one may present a wide and interesting field for investigation of the etiologic factors involved. Moreover, in recent years, such a large proportion of papers and case reports have dealt with the important subjects of endoscopy, diseases of the accessory sinuses and tonsils, and new surgical procedures, that the writer felt that it might be worth while to call the attention of the Association to this subject.

Case 1.—E. R., aged eleven years, presented himself at my office November 16, 1916, complaining of dyspnea and noisy breathing, with exacerbations of symptoms at irregular intervals—i. e., daily, weekly, or once in several weeks. These exacerbations were precipitated by reading or writing, but often occurred during sleep.

The attacks began with a short cough or two, followed by inability to breathe, cyanosis and occasionally unconsciousness for a minute or two, and terminated with the expectoration of mucus. After the attack he was unusually nervous and irritable, and occasionally he did not know that it had occurred. His breathing was usually audible but worse at times, especially at night when it could be heard from the adjoining room. His voice was weak, and he cleared his throat with difficulty.

Examination of his nose and throat showed a slight sub-acute nasopharyngitis, a moderate backward tilting of the epiglottis with the vocal cords in the median line, both on phonation and inspiration. Because of the position of the epiglottis and the irritability of the patient, it was impossible to see the cords during quiet respiration, but the moderately high-pitched stridor was constant.

*Read before the American Laryngological Association at Atlantic City, N. J., May 29, 1917.

Family History.—The father contracted syphilis five years before the birth of this child, and a recent examination of his blood gave a positive Wassermann. The mother appeared healthy, and one year ago her blood showed a negative Wassermann. There have been three pregnancies. The first child was born at term, but only lived a few days, during which time it had many convulsions. The second is the subject of this report. The third, one year old, was healthy and showed a negative Wassermann of the blood.

Personal History.—The case under discussion had blebs on his hands and feet for several days after birth, and the attending physician prescribed inunctions. He has had no convulsions nor loss of power in his extremities.

Dr. Theodore Le Boutillier reports that he has treated the patient since he was four months old, at which time he was a perfectly normal, healthy baby. There was a slight thickening of the anal folds, but not enough to call a true condyloma. He had measles, whooping-cough and chicken-pox.

At five years of age there was a swelling of the right thigh which was thought to be tubercular, but it cleared up rapidly after incision. At six years he developed ptosis of the right eyelid, with internal strabismus and dyspnea. At this time Dr. M. F. Butler made several examinations of the larynx and always found the cords in adduction. Examination of his blood showed the Wassermann to be four plus. He had three doses of salvarsan, and within a few months the Wassermann was reduced to "slightly positive" and the ptosis and dyspnea disappeared. A year later (1913), the ptosis recurred. In September, 1915, the dyspnea recurred and has been present ever since. Several X-ray examinations of the chest have been made with negative results.

The parents object to a direct examination of the larynx and trachea, and it has not seemed advisable to urge it on account of the extreme irritability of the child.

During the six months that he has been under my observation, the nasopharyngitis has disappeared, but the cords remain in the same position, except that there is a very slight abduction of the left cord during inspiration and the paroxysms occur less frequently. He has been on mercurials and iodids

intermittently since six years of age, and developed normally until a year ago, since which time he has lost eleven pounds.

Neurologic Report, April 19, 1917, by Dr. N. S. Yawger: The child is intelligent but impetuous and irritable. The gait is normal and he is slightly ataxic with the eyes closed. There is paresis of the right external rectus muscle. The pupils are dilated equally, irresponsive to light and in accommodation. The upper extremities are slightly ataxic, and the muscular power is fair. The biceps and triceps jerks are absent on the two sides. There are no sensory changes. In the lower extremities the muscular power is fair, and the patellar jerks are absent. There is no Babinski on either side and there is no clonus. There are no sensory changes. The abdominal and cremasteric reflexes are present on both sides. The bladder and rectum are continent. There are subjective pains at times in the arms and legs. The handwriting is normal. So far there appears to have been no syphilitic involvement of the brain or cord. The muscular atrophy is uniform and is due to the general debility.

The child at present does not have the symptoms of tabes dorsalis, though there is a later possibility. We know that tabes is a common cause of this form of paralysis and that it may be confined to the abductors for years before the development of unquestionable symptoms of locomotor ataxia.

Gordon states that juvenile tabes has been seen in very young individuals, and even in children of nine years, although only one case is on record with necropsy. Hereditary syphilis can always be traced in the family history, and the Wassermann reaction is positive in a much larger proportion than in adults.

Diagnosis.—The child has congenital syphilitic cerebrospinal meningitis. The ocular paresis results from cerebral meningitis. The abductor paralysis may be due to luetic changes in the recurrent laryngeal nerves.

Case 2.—On January 23, 1917, I was called to see a patient who had just been admitted to the Polyclinic Hospital with rather urgent dyspnea. I found a somewhat emaciated Jew

with labored breathing, an anxious expression and slight cyanosis.

Examination of the larynx showed both cords dark red and slightly thickened. The left was immobile in the median line, the right abducted slightly on inspiration. He could not swallow solids, but could swallow liquids with difficulty. The dyspnea was not sufficient to demand surgical interference, but the house doctor was directed to be ready for an immediate tracheotomy.

The following history was obtained: He was born in Russia sixty-two years ago. He has five children living and well. Three died when young, from unknown causes. There was nothing in the history to suggest clues. The only sickness he recalled occurred when he was thirty years old, lasted two months, and was supposed to have been typhoid. Although he worked steadily as a shoemaker, he was never robust and for many years, possibly since the attack of typhoid, he had been troubled with slight dyspnea when lifting or in the recumbent posture. About five months ago he began to notice an increase in the dyspnea, especially at night, and it was accompanied by pain in the throat and by dysphagia. These symptoms gradually increased until the latter part of last December, when he was admitted to the Hospital of the University of Pennsylvania, under the care of Dr. Husik, who reports that a view of the cords was not obtainable on account of edema of the larynx, that he could not swallow and breathed with much difficulty. The Wassermann test of the blood was made twice, and was negative. His condition improved, and after one month he left the hospital. Ten days later he was admitted to the Polyclinic Hospital, as noted above.

After two weeks of rest in bed, with strophanthus for his weakened heart, his general condition, breathing and swallowing improved. He was then examined under local anesthesia by the direct method, and the trachea showed a bilateral narrowing about three inches below the cords which were then slightly further apart, the right moving more than at the first examination. The stenosis seemed to be produced by pressure on both sides of the trachea and presented a cleft about five

millimeters wide, extending anteroposteriorly. The mouth of the gullet was constricted.

The fluoroscope showed a large growth, mostly on the right side of the trachea, extending from above the clavicle to the third or fourth dorsal vertebra. It did not pulsate.

February 29, 1917.—The physical examination shows the eyeballs small, pupils equal and reacting poorly to light and accommodation. The tongue is coated, many teeth are missing, and there is a slight enlargement of the thyroid gland, especially on the right. In the center and over the left clavicle are found small nodules attached to the thyroid. The veins are slightly distended. The right side of the chest is larger than the left. The heart is rapid, not enlarged, and the first sound at the apex is impaired. There is slight anterior curvature of the spine. The breathing in the supraspinatous fossæ is harsh on the left and feeble on the right. The sputum is negative for tubercle bacilli. The extremities are emaciated. The liver and spleen are not enlarged. There is no edema of the legs, and the knee jerks are feeble.

Provisional Diagnosis.—Carcinoma of the thyroid gland. After five weeks of rest in the hospital, he was strong enough to go home and report to the dispensary for treatment. His dysphagia and breathing were distinctly better, the right cord abducting as far as the cadaveric position and the left cord showed some bowing. Notwithstanding the three negative Wassermann tests, he was placed on mixed treatment for one week and inunctions for two weeks and gained eight pounds.

At this time the radiogram showed that the growth had decreased one-third in width. Three weeks later the roentgenologist reported that it was much smaller and that the oesophagus was displaced slightly to the left. The growth moved on swallowing and with the heart beats, but did not expand as an aneurism. The mediastinal glands were still enlarged.

May 4, 1917. The patient is still taking a tonic and inunctions of mercury, and his weight has increased fourteen pounds. He sleeps well and has no pain and no stridor even on exertion, but there is slight dyspnea on climbing stairs or rapid walking. He breathes more easily when in the upright position and with the head slightly forward. The voice is clear

but rather weak and tires easily. The abduction of the cords is incomplete. Beginning with the first ring, the trachea is compressed bilaterally to three or four millimeters, the upper rings being plainly visible. As the tube passes further down the outline of the rings disappears, the mucous membrane being thickened and reddened, the lumen smaller and on reaching the level of the aorta the aspect changes in that there is a posterior bulging into the lumen, changing its shape to that of a crescent and reducing it to about the thickness of heavy writing paper. The bulging portion is deep red, and pulsates synchronously with the heart beat. It seems unsafe to force the tube by this obstruction. Considering the almost complete occlusion of the trachea, it is remarkable that there is so little dyspnea. The nodules in the neck are small and do not seem to be growing. This case illustrates the possibility of both a laryngeal and tracheal stenosis occurring in the same individual.

I wish to refer briefly to a third case which I report from memory. Several years ago I was asked to see a woman about forty years of age, who had been operated upon for a very large thyroid gland. She was scarcely out of ether and was suffering from considerable dyspnea with some cyanosis.

An examination with the laryngeal mirror showed both cords in the median line with no movement except a slight flapping of the edges on breathing. I suggested a tracheotomy, but the operator said it could be easily and quickly done through the thyroid wound and decided to wait. A few hours later, the dyspnea became more urgent and a tracheotomy was decided upon, but on changing the patient from the sitting to the recumbent position, she succumbed in spite of a hurried tracheotomy, demonstrating the too frequent error of postponing tracheotomy until the patient is almost exhausted.

A comparison of the symptoms in these three cases illustrates the variation in the severity of the dyspnea, depending upon the rapidity of the onset of the paralysis. Although the first two cases are in danger of death from asphyxia, they have been able to go about for many months with relatively little discomfort from obstructions which are little if any less

than that which was fatal to the postoperative case in which the paralysis was very rapid in its appearance. Bert believes the greater mortality from sudden obstruction is due to reflex paralysis of the respiratory centers through irritation of the laryngeal nerves and Krieger maintains that it is due to irritation of the cardiac branches of the vagus.

1926 Chestnut Street.

REMOTE RESULTS OF FOCI OF INFECTION IN THE
NOSE AND THROAT.*

BY JOSEPH B. GREENE, M. D.,

In selecting this subject it is fully realized that nothing new and startling is being offered—in fact, it may seem a bit trite, but yet so great is its importance that one may be pardoned for repeating much that has been said by others. However, there are certain phases of this subject that have not been sufficiently emphasized, and which will bear repetition at this time. There is no question that a great majority of the foci of infection causing local and systemic disease occur in some part of the head, yet we must not ignore other infecting areas of the body, as the gall bladder, appendix, prostate glands and seminal vesicles, pus tubes, infected bronchi, etc. The fact that so many infecting foci occur in the field embraced in our specialty places a great obligation upon us, not only to search with painstaking care every possible area of infection within the field of our special work, but also to inform the profession in general of the great danger lurking in the cavities and crypts of the nose and throat. The teeth and the alveolar processes, and the middle ear and mastoid cells, while not strictly coming within the scope of this paper, will on account of their intimate relationship be necessarily referred to but not discussed at length. It is a well known fact that the tonsils may receive their infection from an infected nasal sinus or from a pus pocket around a tooth (*pyorrea alveolaris*). Then again the sequence of an infection of the middle ear or a mastoid from an acute sinusitis or an acute tonsillitis is one of the most frequent in our experience. The teeth with the adjacent tissues and bony processes may contain hidden foci which are difficult to locate, and which frequently require the aid not only of a dentist, but also the services of a competent roentgenologist. Our work is becoming

*Candidate's thesis for membership in the American Laryngological Association, May, 1917.

so concentrated, and so much is demanded of us in the way of accuracy of diagnosis that medical men no longer stand alone, but must work in closer cooperation with others engaged in special lines of work. There is no place where "team work" counts more for the patient's good than in fathoming a hidden focus of infection which is causing some serious local or systemic disturbance. A competent, up-to-date dentist who is able correctly to interpret X-ray findings can be of the greatest help in reaching a correct diagnosis. While those who live in smaller cities may lack some of the laboratory facilities afforded by the larger medical centers, they can, by grouping themselves with careful workers in other fields of medicine and dentistry, do much to locate hidden foci of infection. In this way only can we in these difficult cases merit the reward and satisfaction which comes from rendering our patient the greatest possible service in ridding him of the immediate causes of some local or systemic disease. In the majority of cases these patients first fall into the hands of the family physician or the general diagnostician, and we are called upon to render judgment in our own field of work. Our task is often a difficult one, for we are at times unable to say that the small sinuses of the head and deep crypts of the tonsils are free from infection. There are, however, certain symptoms and physical evidences which tend to convict these areas of playing a rôle in the systemic infection. Of this, more will be said later. The work of the dentist is a bit easier, for in the majority of cases a close examination of the teeth and the gum margins, together with a careful X-ray film of the alveolar processes, should reveal evidence of dental trouble. Certain rare forms of granuloma may not show on the film.

The question of focal infection as a factor in producing systemic disease is not new, for members of our profession have been diligent in urging its importance for a number of years. However, it is only within the last decade that the medical profession has begun to fully appreciate its importance. The close relationship of acute rheumatic fever, endocarditis, and chorea to acute tonsillitis was early recognized. Some writers, however, failed to interpret the relationship of these symptoms to the source in the tonsils, as was evidenced by the term "rheumatic sore throat." Even now we occasionally hear the

laity use this misleading term. It is worthy of note that Osler, who has been a leader and pioneer in everything affecting internal medicine, in the second edition (1897) of his *Practice of Medicine* offered these theories as to the cause of rheumatic fever: (1) The metabolic, (2) the nervous, and (3) the germ theory. Although he leaned to the germ theory at that time as to the causation, yet he speaks of the inconstancy of the microorganism found in the disease. In a later edition he classes acute rheumatic fever among the "Specific Infectious Diseases," instead of the "Constitutional Diseases." It is interesting to note in this early edition of Osler's *Practice of Medicine* (1897), the accuracy with which he describes the pathology of chorea as expressed in the following statement:

"Embolism of the smaller cerebral vessels has been found, as might be expected, in a disease with which endocarditis is so frequently associated; and, based upon this fact, Kirkes and others have supported what is known as the embolic theory of the disease." He says, further, in reference to the microbic origin of the disease, that "In favor of this view it has been urged, as it is impossible to refer the chorea to endocarditis, or the endocarditis in all cases to rheumatism, that both have their origin in a common source, some infectious agent which is capable also in persons of exciting articular disease." It is noted that nothing is said specifically in reference to the tonsils, though strong argument is offered in favor of the infectious origin of chorea. It was much easier to trace the association of acute rheumatic fever and chorea to an acute tonsillitis than it was later to associate the arthritis, endocarditis, nephritis, cholangitis, appendicitis and other remote lesions to a focus in the head which was apparently latent and giving no symptoms. It was not till the wonderful work of Rosenow¹ was published showing the transmutability of various strains of pathogenic organisms of the streptococcus-pneumococcus group, and also the tissue affinity of certain pathogenic cocci for certain tissues of the body that the subject of focal infection assumed fresh interest. It explained certain difficult problems, as the inconstancy of the type of organisms found in certain conditions as rheumatic fever. Rosenow by his own discovered methods of culture was also able to find in the fluids of inflamed joints and the nodes adja-

cent thereto organisms which had been overlooked by other careful observers. He was also able to produce by intravenous injections of rabbits with culture obtained from infected areas corresponding lesions in a large percentage of cases. The same result was obtained by injecting the organism found in the original focus of infection. By altering the character of the culture medium he was able to develop in the organism affinity for certain tissues. For instance, Rosenow succeeded in cultivating the streptococcus pyogenus on media containing kidney extract, which produced kidney lesions in animals inoculated. Tissues of other organs, as the gall bladder, appendix, etc., were treated in the same way, and there was developed a corresponding lesion in the inoculated animal. It is thought that these organisms acquire certain pathogenic elective tissues affinity in the foci of infection.

According to Billings,² "The main and fundamental principles which have been proved are: (1) The apparent confirmation of the transmutability of the members of the streptococcus-pneumococcus group in varieties of morphology, cultural characteristics, biologic reactions, and also of general and specific pathogenicity; (2) The acquisition of pathogenic elective tissue affinity by bacteria in foci of infection in culture media and serial animal passage." To be convinced of this as a scientific fact it is only necessary to read carefully the writings of Rosenow and Billings.

It is natural that the upper respiratory tract should bear the brunt, so to speak, of focal infection when we consider the complicated anatomic structure, with enclosed cavities and pockets all covered by a delicate layer of mucous membrane. In this connection it is interesting to quote from the experience of George B. Wood:³ "Experimental work has shown that the tubercle bacilli can pass through the unaltered cryptal epithelium, and recently in a series of experiments I found that the anthrax bacilli will also penetrate through the normal cryptal epithelium, and that to the exclusion of other portions of the pharyngeal mucosa. After gaining entrance to the tonsillar parenchyma the action of the toxin of the anthrax bacilli destroys the vitality of the tissues and points the way for a secondary invasion of staphylococci and other organisms."

Then again the nose and throat are constantly exposed to

the danger of infection from the air and food. It is a well known fact that the mouth is normally inhabited by a large flora of saprophytic and parasitic organisms. It is generally agreed that the tonsils, including the lingual and pharyngeal glands (adenoids), take first place as a focus of infection, with the sinuses of the head, teeth, and ear contributing their quota of systemic disturbance. After the first decade in life the importance of the teeth as foci of infection is greatly increased as the result of their decay, which requires capping, crowning and plugging. "Overdentistried" teeth become great sources of danger as infecting areas, and should at once arouse suspicion when endeavoring to locate the hidden focus.

A variety of microorganisms have been isolated from foci in the nose and throat, chiefly the streptococcus hemolyans, streptococcus viridans, streptococcus mucosus, micrococcus catarrhalis, pneumococcus, staphylococcus, grippe bacillus, diphtheria, and pseudodiphtheria bacillus, tubercle bacillus, and a few other pathogenic microorganisms. The number of local and general diseases caused by the entrance of microorganisms into the general circulation is a large one, and is being gradually increased. Diseases which are due to confined areas of infection form a large and important group. The character and type of a primary syphilitic focus in the nose or throat is so unlike the usual type of confined infections under consideration, and is likewise rare, that it may well be omitted from discussion.

The diseases which may have their origin in foci of infection in the head are acute rheumatic fever, endocarditis, pericarditis, myocarditis, chorea, pleuritis, arteritis, nephritis, gastric and duodenal ulcer, cholecystitis with and without gall stones, pancreatitis, appendicitis, neuritis, myositis, adenitis, Hodgkin's disease, iritis, acute thyroiditis, goiter, osteomyelitis, spinal myelitis, brain abscess, labyrinthitis,⁴ erythema nodosum, herpes, urticaria, and bronchial asthma. The last named, bronchial asthma, is so different in its character and relation to the infected focus that it will be considered entirely apart from the other diseases. It does not seem advisable to divide the diseases considered to arise from foci of infection into acute and chronic, as is sometimes done, for often there is no sharp line dividing one from the other. The acuteness of

the reaction to an invading organism may depend upon: (1) the character and virulence of the organism, (2) their number, (3) the resistance, local and general, of the individual. Rosenow has shown that the local environment of certain organisms in a given focus particularly as to the oxygen tension, may not only alter their type morphologically and culturally, but also change their virulence. They may also develop a certain tissue affinity (tropism) in the focus which markedly affects the location and type of the disease. However, certain types of organism show a predilection for the tissue found in the crypts of the tonsils or adenoids, the sinuses of the head, the teeth and the alveolar processes, or cavities of the ear. For instance, the streptococcus viridans is the organism most frequently found in diseases of the alveolar processes, and is also found in the heart valves, and in the blood of patients suffering from chronic infective endocarditis. The streptococcus hemolysans is the usual organism found in acute septic sore throats, and likewise in the affected joints and endocardium. Tubercle bacilli are found in the crypts of the tonsils and adenoids, from whence they break through the barrier and invade the glands of the neck and mediastinum. When this local resistance is overcome they extend still further and invade other tissues of the body.

Organisms from foci of infection reach the system either through the blood stream or the lymphatics, more frequently by the former. Through the act of swallowing, virulent material from the nose and throat may reach the general circulation from the gastrointestinal tract. After reaching the general circulation they find lodgment in the capillaries and terminal arterioles producing capillary embolism. Adami says it is more like a thrombosis. When bacteria are halted in the blood stream there is produced at the site proliferation of the endothelial lining and an exudation of leucocytes and plasma cells. At times there occurs a hemorrhagic exudate, and there may be a resulting formation of scar tissue. It is now thought that appendicitis, peptic ulcer, and cholecystitis may be produced in this way by a lodgment of the organism from a focus in the small vessels of the submucous layer of the organs. General surgeons have often noted the occurrence of appendicitis following an attack of acute tonsillitis. It would

likewise be easy for a focus in chronically diseased tonsils or elsewhere in the head to cause serious lesions in distant organs without attention being directed to the primary focus. This is really what usually happens. Loeb,⁵ in 1910, called attention to a series of cases of acute nephritis due to tonsillar infection. On account of the hematogenous nature of the infection the type of disease in the kidney is usually a glomerulonephritis. In case of severe toxemia due to absorption of soluble toxins, as in scarlet fever and diphtheria, there is produced a diffused nephritis (large white kidney). There may be more than one primary focus in the head, so it is not sufficient in searching for the origin of the systemic disturbance to say that the patient has a focus, as in the tonsils, the teeth area, the sinuses or the ear. Should one focus be removed and others left to continue their discharge of virulent organisms into the circulation, our patients would not receive the benefit from surgical procedure which they had reason to expect.

On account of the great difficulty in giving the tonsils a "clean bill of health," so to speak, however innocent they may appear, the writer is in the habit, particularly in adults, of calling in the services of a competent dentist, who makes use of X-ray films in his work, in order that no focus of infection in the teeth and alveolar processes may be overlooked. The sinuses of the head and ear with the mastoid region should be examined with great care, calling into use the roentgenologist when necessary. By proceeding in this way we may spare our patient a needless operation. Richardson⁶ has emphasized the importance of caution in diagnosis before resorting to needless tonsillectomy. French⁷ has been using a method of transillumination of the tonsils for the diagnosis of inflammatory conditions. We shall await his final report with interest. The hypodermic needle has been used in the search of a hidden foci in the tonsil. Shambaugh⁸ rightly says: "As regards the appearance of the faucial tonsil which is a focus for systemic infection, it is quite clear that the size of the tonsil is no index of the menace this structure may be to the individual." It is true that the small tonsil frequently contains a dangerous focus for systemic infection; on the contrary, the writer is inclined to be more suspicious of the large tonsil in the adult. In children there is frequently seen a type of

tonsil which projects prominently into the throat, and which is only slightly covered by the pillars. This type, while apparently large, is less likely to give systemic trouble on account of better drainage of the crypts. There is another type of tonsil which always arouses our suspicion. It is the type particularly in children which is apparently small, so well is it buried behind the pillars of the fauces. On removal, however, its size is found to be surprisingly large. It is covered by the pillars, and the mucous membrane of the palate interfering with the drainage of the crypts, especially those of the upper lobe, places the owner in constant danger of systemic infection. Coolidge and Garland⁹ have weighed tonsils removed, and their results were surprising in showing only slight variation in size. The irregularly shaped tonsil with fissures projecting beneath the surface of the gland should always excite our suspicion. When the mouths of the crypts show exudation of purulent material we have positive evidence of the infected tonsil. Firm pressure on the tonsil made through the anterior pillar will often reveal a cheesy purulent exudate. In chronic tonsillitis there is often noted a peculiar livid redness of the pillars not noted in the relatively healthy gland. The tonsillar gland near the angle of the inferior maxilla is likely to be quite palpable in case of chronic tonsillitis, though this is not invariably the case. It is remarkable how many people go about harboring these infected foci in the tonsil with no local or systemic symptoms. However, when one's resistance is lowered by overwork, undernourishment, bad hygienic surroundings, exposure to heat or cold, overindulgence in alcohol, or excesses of any kind, the confined focus may become active and there may ensue symptoms of both local and constitutional disease. We have a parallel to this condition in tuberculosis of children which may remain latent for years in the glandular system, till later in life, when something lowers the resistance and active tuberculosis has its beginning.

In searching for foci of infection in the sinuses every means should be employed to reach a correct diagnosis of their condition. While X-ray findings are considered of more value than transillumination, yet the latter is often of distinct value, especially in the maxillary sinus, and is particularly useful on account of its simplicity. Irrigation of the suspected sinus

is the best proof of the presence or absence of pus. The X-ray is absolutely essential for the examination of the teeth and the alveolar processes, and is helpful in cases of suspected mastoiditis.

The pharyngeal tonsil (adenoids) on account of better drainage of its crypts is less likely to contain a focus of infection than the faucial tonsil. Yet tuberculosis of this gland occurs with a considerable degree of frequency. Many times inflammation in the nasopharynx is evidenced by enlargement of the posterior cervical group of glands. Goodale¹⁰ has emphasized for us the importance of infections arising from the lymphatic glands on the posterior wall of the pharynx. The secondary foci of infection arising from the nose and throat may be more virulent than the original source of infection. The appendix or gall bladder may form secondary foci supplying pathogenic bacteria to other organs of the body. The establishment of these secondary foci explains why infectious arthritis continues to spread from one joint to another or to the endocardium, long after the primary focus has been removed. This fact should make us a bit guarded in our prognosis of these difficult cases, but yet our duty in removing the primary focus is none the less urgent. In our efforts to make a diagnosis of a focal infection we should take a careful history of the case. This is just as important as the physical findings, especially is this true in reference to the faucial tonsils. The patient will often give a history of frequent attacks of tonsillitis, especially in early childhood. He may have had scarlet fever, or diphtheria, which was followed by a "weak throat." There may be a history of incomplete tonsil operation where a portion of the gland was left with the mouths of the crypts sealed by scar tissue. A former cervical adenitis or ear trouble is very important. Inquiry should be made as to the occurrence of rheumatism. In young children this may be evidenced by what is known as "growing pains." The patient should be questioned in regard to the teeth, particularly in reference to plugging, crowning and nerve killing. In regard to the nose, the patient should be asked as to the occurrence of so-called "nasal catarrh," freedom of nasal breathing, headache, and a history of influenza attack. Many cases of chronic

sinuitis have their origin in an old untreated grippal infection of the sinuses.

As preventive treatment is now the order of the day, it would seem that we as specialists should do our part in educating the public through our patients to take those precautions which will in a measure safeguard them from the kind of infection under consideration.

Chronic focal infections which work such havoc on the human organism often have their origin in an acute infection of the nose or throat during childhood. We should teach that all acute colds are contagious, and so far as practicable patients suffering from the disease should be isolated. This is all the more important in children on account of their greater susceptibility, and because of the greater seriousness of both immediate and remote results. Hastings¹¹ has emphasized the harmfulness of swimming pools and sea bathing during attacks of acute rhinitis. There is danger of driving the infection into the sinuses of the head and to the middle ear. In case of the public swimming pools there is likewise danger from a public health standpoint. Patients with acute colds should be taught to cough and to sneeze into gauze to be subsequently burned, just as our tuberculosis patients are required to do. The latter is far less contagious than the former. The patient should be cautioned in blowing the nose, to obstruct only one side at a time, in order to protect the middle ear. There is also a danger in nasal douches in the hands of our patients, and their use is seldom justified. Complications of an acute cold are much less likely to ensue if a patient from the beginning is put to bed and the usual local and constitutional treatment instituted. Many cases of acute rhinitis are complicated with sinuitis, and Davis¹² has shown how frequently acute ethmoiditis occurring in children is overlooked. Again, ethmoiditis at this time may be the starting point of a chronic process in later life. There is another danger in the increasing popularity of sleeping porches for young children in all kinds of wintry weather. If used in cold weather at all, there should be ample protection from the wind. In certain cases of acute rhinitis, laryngitis, and bronchitis, cold is surely harmful. Morse¹³ has emphasized this in cases of bronchitis and laryngitis complicating pneumonia. Mothers should

be taught that earache is not to be regarded lightly and requires more than the instillation of sweet oil or laudanum. They should likewise be impressed with the fact that a running ear is a positive danger, and requires the most skillful care a specialist can give. Many chronic foci in the ear and mastoid have their origin in the neglected ears of childhood. It is a common observation that the number of ears requiring mastoid operations has been greatly reduced since tonsillectomy and adenoidectomy have become more general, and likewise more thorough. The public should be instructed in reference to the importance of oral hygiene, and the dentists can contribute their share in this direction. Thorough cleansing of the teeth with a good brush is absolutely essential to keep the gums and teeth in a healthy condition and to prevent deposits from forming around the gum margins. To this end a regular visit to the dentist is necessary, and attention should be given to early decay of the teeth before extensive necrosis has taken place. Contrary to the general opinion, the first teeth should receive the same care as the permanent teeth. On account of the close relationship between the roots of certain teeth and the antrum, their care assumes a twofold importance. As already referred to, there is a close relationship between infected gums and alveolar processes and tonsillitis.

The treatment of focal infection in the nose and throat depends upon whether the case be acute or chronic. Obviously the treatment of an attack of acute tonsillitis with arthritis will differ from that of a case of chronic tonsillitis with joint involvement. There are two well established methods of relieving an individual of an infected focus, one by entire removal, and the other by drainage. In chronic tonsillitis we resort to the former, and in sinuitis we practice drainage. In acute tonsillitis, with or without secondary foci of infection, it is not advisable to remove the tonsils. Billings says the course of acute rheumatic fever is not materially affected thereby. Without going into the details of the medical care of acute tonsillitis the writer would urge the use of salicylic acid in sufficient dosage, as it seems to have a specific effect on the streptococcus rheumaticus or its toxin. Barnes¹⁴ advises swabbing the tonsils with 50 per cent nitrate of silver, if seen early in the course of the disease. A peritonsillar ab-

cess should be incised as soon as pus formation has taken place, which is usually about the third day, as fatal septicemia may result from too long delay of this surgical procedure. Without going into the details of the management of acute sinusitis, suffice to say its care should not be neglected. An early convalescence depends upon adequate ventilation and drainage. Shrinking the mucous membrane of the nose with such agents as a weak solution of cocaine or menthol solution is desirable. The Coffin¹⁵ suction apparatus is often used to facilitate drainage from the infected sinus. Irrigation of an infected antrum, preferably through the natural opening, is essential for the successful treatment of maxillary sinusitis. The importance of early incision of the drum membrane in acute otitis media has been so generally recognized that it seems unnecessary to emphasize it at this time.

Chronic foci of infection in the nose and throat as a rule demand surgical treatment. The tonsils being the most important will be considered first. Nothing will be said as to the technic of their removal except that the operation must be thorough, with a minimum of trauma to the surrounding tissues. So serious for the patient is the systemic disturbance arising from foci of infection in the tonsil that we are rarely justified in the use of halfway measures, as incision of the crypts or the use of the cautery or curette. In case of very slow coagulation time of the blood, or extreme old age, we may be justified in doing less than a complete tonsillectomy.

Albuminuria with casts, instead of being a contraindication, may be a positive indication for tonsil removal. This condition of the urine in two recent cases of children operated on by the writer cleared up promptly after tonsillectomy, and the ether itself had no harmful effect, as shown by urinary findings following the operation. Billings¹⁶ says in this connection: "Infectious acute nephritis due to specific elective tissue affinity of certain bacteria, especially members of the streptococcus group, demands an early removal of the focal cause. By this means death may be prevented, and if the anatomic injury to the kidney is not too great the function may be preserved to a degree consistent with health for many years." In adults, however, with kidney complications local anesthesia should be used.

Valvular heart disease (if compensation is not broken) is no contraindication for tonsillectomy. In older children and adults local anesthesia should be used. Though the operation cannot repair the injured valve, it might spare the patient a fresh invasion of bacteria, with serious consequences to the valvular lesion.

In chorea personal experience with tonsillectomy and adenoidectomy has been so satisfactory that the author is inclined to urge operation in these cases in the absence of other foci of infection. Three recent cases cleared up promptly and suffered no serious disturbance incident to the operation. The fact that they had no complications with secondary foci in the joints or elsewhere may explain the favorable results following the operation. Crowe,¹⁷ on the other hand, with a large experience, advises against operation in chorea.

Without attempting to give the dental treatment for infection of the teeth and alveolar processes, the dentist's attitude is not infrequently too conservative, showing a tendency to treat these infected foci where an extraction of the affected tooth would better safeguard the patient's health.

Bronchial asthma, as distinguished from the so-called cardiac and renal asthma, is now regarded in the light of an anaphylaxis. This phenomenon was first noted by Theobald Smith, and later by Rosenow and Anderson.¹⁸ Auer and Lewis¹⁹ and Meltzer²⁰ also showed the similarity of anaphylactic paroxysm to bronchial asthma. They explained that it was due to a spasm of the bronchioles and not caused by a nervous reflex, as was so long held by many clinicians. They were able to demonstrate the symptoms of spasmodic asthma in guinea pigs after severing all nervous connection with the spinal cord. Babcock²¹ was one of the first clinicians to emphasize the connection between bronchial asthma and foci of infection in the nose. Since that time Mathews,²² Lewis and others have added their clinical observations. In the discussion of this subject in the light of foci of infection, consideration will not be given to certain types of asthma which are intimately associated with the ingestion of certain foods, and with asthma and hay fever due to pollens and emanations from the horse.

We must regard spasmodic asthma in an entirely different light from other systemic diseases which have their origin in

foci of infection in the nose and the throat. In the diseases previously considered there was a bacteremia with emboli in capillary vessels of various organs of the body. In asthma, however, we have the absorption of a protein substance to which the cells of the body have been sensitized; it may be a proteid of bacterial origin, or in some cases the products mucus or pus found in the sinuses. Mathews²² from his experiments reached the conclusion that "mucus or pus, either infected or sterile, is capable of acting as an antigen and that the products of bacteria are not essential in producing either sensitization or shock." Whether these findings can be wholly accepted or not, the fact remains that the relief of our patients depends upon ridding him of these areas supplying the system with sensitizing proteids. The frequent association of nasal polypi with asthma has long been noted, but it was thought that the former was only a symptom or local manifestation of the constitutional disease.

Lately we have regarded nasal polypi as a symptom of chronic sinusitis often due to hyperplasia of the ethmoid cells and not necessarily a purulent ethmoiditis (Beck²³). The treatment of this type of asthma must be based on an accurate diagnosis obtained from a careful history of the case, followed by a thorough examination. Carefully made X-ray plates are of great service in determining the condition of the sinuses. That most brilliant results may be obtained in the treatment of these cases where one sinus alone is involved has been demonstrated by two recent cases. The antrum cases seem to respond particularly well to treatment. The structure of the ethmoid offers difficulties which may require time and patience in eradicating the focus. The secret of success in all cases is thoroughness of drainage.

In January of the present year (1917) the writer operated upon a man of middle life who had come from New England to Asheville seeking climatic relief for his asthma. After spending several months in the mountains without benefit, he decided to have an operation performed upon his nose. His was an unusual condition in that he had a single pendulous polyp attached in the region of the bulla ethmoidalis on the left side. This was removed and the cells adjacent to the point of attachment were curetted. As was to be expected,

he had asthma in rather severe form for several days following the operation, but since that time to the present day, more than three months, he has not had a sign of asthma, in spite of several attacks of "cold." Frequently we encounter cases where the result of operations are not so satisfactory, but failure or partial success in these cases may be attributed to our inability to eradicate the foci of infection in the nose or the presence of foci elsewhere in the body. Unfortunately, there is often a complicating bronchitis, or a bronchiectasis, which is a source of the sensitizing proteid. It may be in just such cases that Freudenthal²⁴ and Horn²⁵ have had success through the establishment of better drainage by the passage of the bronchoscope. Although the foci of infection in asthma are most frequently in the sinuses, yet we must not disregard other foci in the head and elsewhere in the body. Babcock²⁶ reports a case which kept well so long as the gall bladder was draining, but in which there was a return of the spasmodic symptoms with a stoppage of discharge from the infected gall bladder.

A consideration of this subject would not be complete without a brief reference to the use of so-called vaccines in the treatment of foci of infection in the head, for even the enthusiastic advocates of this therapy do not pretend that it will supplant surgical treatment in these chronic infected areas. It was held for a long time by careful workers in this field of medicine that the action of vaccines on various infectious processes was specific, and that the only ones worthy of consideration were the autogenous vaccines. It was found very difficult at times to isolate the particular organism which was the cause of the inflammatory condition; especially was this the case in open foci in the nose and throat. Then again, as previously referred to, recent workers have shown how certain pathogenic organisms, particularly of the streptococcus group, vary as to their strain under different environments which markedly alter their pathogenicity and likewise their selective tissue affinity. These recent discoveries have necessarily modified our views as to the efficacy of autogenous and stock vaccines. However, we cannot ignore the clinical experience of such careful workers as Coates²⁷ and others, particularly in chronic suppurative ears. There seems to be

ground for hope that in the future there will be developed a nonspecific protein substance which on injection will contain offensive and defensive substances against the invading organism and its toxin, without giving in to the violent reaction, the chill, high temperature, and marked leucocytosis following their use. It is hoped that these careful laboratory workers will continue their efforts along this line till an efficient antigen is found which will be without danger to the patient.

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XI.

REMOVAL OF FOREIGN BODIES FROM THE LARYNX, DISPROVING PREVIOUSLY MADE DIAGNOSIS.*

BY HILL HASTINGS, M. D.,

LOS ANGELES.

The rapidly growing use of direct laryngoscopy is showing up many incorrect diagnoses, especially in children, where foreign bodies were found in the larynx and trachea. The increasing number of them makes one feel that it is worth while to report all such cases. The accumulation of reports of this kind is unquestionably arousing the general medical profession's attention to the possibility of foreign body impaction in babies who are supposed to have "croup," "thymic asthma," and other obstructive conditions.

A fear that is met with in handling babies with obstructed breathing is the feeling that fatal asphyxia will occur during direct laryngoscopy, or subsequently after removal of the foreign body, from edema of the glottis. A preliminary tracheotomy is therefore often urged by the family physician, and many of us who are aware of our own lack of skill will often be rather willingly persuaded to do a tracheotomy before attempting the removal of foreign bodies in babies.

I would like to present a report of two cases (both babies), with incorrect diagnoses, in which foreign bodies were found impacted in the larynx.

Baby L., aged seventeen months, had been sick for a week with "croup," with gradually increasing obstruction to breathing. The father, a physician, and a brother practitioner had been treating the patient with the feeling that the trouble was "croup" with slight bronchitis. No diphtheritic membrane had been seen in the throat, and cultures from the secretion

*Read before the American Laryngological Association, Atlantic City, N. Y., May, 1917.

had been negative for diphtheria. There had been slight respiratory obstruction and a little fever—100.6 the highest. The baby was asleep in bed at the time of our consultation and was breathing with audible roughness, but without cyanosis and without any considerable difficulty. The possibility of foreign body impaction was suggested, whereupon the father said that he dated the trouble to a little choking spell which the child had had when fed some soft boiled egg; but that the child had not really suffered much until two or three days later, when the increasing croupy cough and cry, and a little fever had made him disregard the choking event. On waking the child its crying increased the dyspnea and brought on some cyanosis, which subsided quickly when the child again became quiet. Indirect laryngoscopy was a failure. The father preferred to await the result of X-ray examinations and the use of simple therapeutical measures before allowing direct laryngoscopical examination. The X-ray examination was negative. The child's obstruction grew gradually worse, and direct laryngoscopic examination was agreed to. After a consideration of the danger of operating without a preliminary tracheotomy it was finally decided to do a tracheotomy.

With the use of Jackson's small size laryngeal speculum a piece of egg shell was found embedded in the larynx, between the cords, protruding into the glottis, giving very much the same picture as is shown in the drawing in Dr. Jackson's book of a similar case. There was considerable edema of both vocal cords and bands, and some purulent secretion. The egg shell was easily removed. Convalescence was uneventful. The tracheotomy tube was not removed for three or four days because of the difficulty in breathing that resulted on attempts to do without it—which supported the contention that a preliminary tracheotomy was advisable.

The history of the second case was rather indefinite. Baby W., sixteen months old, was hurriedly brought from the country to the California hospital because of great dyspnea. The child was already on the operating table when I first saw it. Tracheotomy instruments had been prepared. The dyspnea was severe. There was enormous distention of the anterior chest wall, marked during efforts of inspiration, but also pronounced during both inspiration and expiration. This chest

wall distention was so great that a large growth of the mediastinum had been suspected. Both lungs were distended. There was a generalized bronchitis, and a temperature of 104° . There was alarming cyanosis and the patient was almost unconscious. The only history obtained was that the illness dated back fifteen days to a choking spell that occurred while the child was sucking a piece of mutton chop bone. The parents were poor and ignorant and lived in the country away from medical aid and did not realize for several days the gravity of the trouble. One of their local physicians, called in after the child had become very sick, had suspected a growth in the chest, or a mediastinal abscess. No X-ray examination had been made.

Foreign body impaction was at once suspected. Immediate tracheotomy was done without any anesthetic. The patient was practically unconscious from the deep cyanosis. On opening the trachea immediate relief was obtained and the acute pigeon breast, tumor-like appearance at once disappeared. The end of a piece of bone was felt at the tracheal opening. The bone, rather firmly impacted above in the larynx, was removed by forceps. It was a large rather thick sliver, about one inch long, sharp at its upper end. The child's fever and considerable purulent discharge and cough continued for a few days. Recovery was complete and the patient was discharged on the sixteenth day.

XII.

RHINOSCOPY.*

By E. M. HOLMES, M. D.,

BOSTON.

Within the memory of many of us the examination of the nasal chambers consisted simply in the spreading of the alæ with some dilating forceps or tube, and the inspection of the anterior ends of the lower and middle turbinates, the anterior portion of the septum and any new growths or foreign bodies which were of sufficient size and favorably situated to come within direct vision through the anterior nasal opening.

The posterior ends of the turbinates and the septum were more or less satisfactorily viewed by the aid of the postnasal mirror, and in the general clinic the results were more frequently less satisfactory than otherwise.

In cases of marked atrophy or of the loss of the turbinate bodies, surgically or otherwise, the direct inspection through the anterior nares was much easier, and the deeper recesses were more satisfactorily examined.

About fifteen years ago the process of roentgenography became sufficiently developed to obtain fairly good shadow-graphs of the bony framework of the nasal fossæ and their associated cavities.

Although accessory sinus disease had been studied and more or less successfully treated before this discovery, the radiograph, aiding in differentiation of area and degree, was a factor in stimulating research, and it began to be more generally recognized that many of the diseased conditions of the nose, both acute and chronic, were due to infection and pathologic changes within one or more of the cells associated with this organ. It was also more generally recognized that many of the nasal conditions showing diseases of the other structures were secondary to some infection of the sinuses.

*Presented with lantern illustrations, by invitation, at a meeting of the Section of Otolgoy and Laryngology of the College of Physicians, Philadelphia, November 15, 1916.

Radical surgery of the turbinates and the ethmoid structures became commonplace, but it was found that these extensive exenterations very frequently left the patient in a condition, though relieved in some ways, permanently incapacitated in others. Were it not for this fact nasal surgery would become extremely simple, for it would make little difference how little or how extensive the diseased condition, the whole labyrinth could be removed and the diseased area be eradicated. Unfortunately, the results following extensive removal of intranasal structure frequently are distressing and grave, and at present the general trend is to conserve all of this structure possible. This makes it extremely important to use every means within our power to inspect the nasal cavities as thoroughly as possible and therefore use all methods known to bring within our vision the various recesses of these cavities.

We all recognize the importance of examining the anterior nares, first without dilatation, and then by some dilating speculum. The radiograph, though frequently misleading, is of service, and at times it gives us very important information. Transillumination like the radiograph may be of service when there is marked increase in density with diminution of transparency due to thick secretion or abnormal growth.

Though it may not be absolutely true that "seeing is believing and sight is infallible," clear vision presents a picture to the observer which is more definite, more correct and more convincing than can be obtained by any other means. There are many areas within the nasal cavities not open to direct unaided vision. They are dark and not in a direct unobstructed line from any point in which it is possible to place the observer's eye. As the structures obstructing the light rays to and from many of these dark recesses of the nose, cannot well be removed, it is necessary to bring to our aid some instrument which enables us to refract the rays so that we can loop around these obstructions. Very trustworthy and most valuable information is given by a lens adjusted periscope, and the most efficient periscope is one which carries at its tip the means of lighting the field of its view. Any combination of lenses in a periscope has necessarily one focal distance. At this distance objects appear at approximately the size they would present if viewed in a straight line at the normal distance for

the eye. At other than the normal focal distance from the fenestra of the endoscope there is a change in the apparent size of the object. If nearer, the object is magnified; if farther away, it appears smaller. The field in the usual endoscopic prismatic lens is always advanced at right angles to the surface of the exposed prism, and as the prism is usually set the field is always at right angles to the length of the tube. These facts are of the greatest importance, and only so far as we keep them in mind and learn to correct the findings are we able to acquire definite and correct knowledge concerning the area which we are studying.

It is as important to acquire a good working technic to use the endoscope as it is to successfully use the microscope. Failing to appreciate this, many rhinologists have tried some instrument a few times and have then discarded it, or have continued its use in a more or less bungling and unsatisfactory manner. All who have become proficient in endoscopic technic and have learned to correctly interpret the findings, I believe will agree that it is one of our best means for observing and diagnosing pathologic conditions in the otherwise hidden recesses of the nose and for guiding the instruments used in treating or removing these abnormalities.

The thing necessary is to study and acquire a thorough working knowledge of the topography, as viewed by the endoscope. It matters little how well we know our nasal anatomy, when we use an instrument which, in practice, carries our visual center to within the nasal cavity, and enables us to view a circumscribed area of the structure from a viewpoint absolutely new, we are naturally like a trampler in a dense forest, viewing some cliff or stream, knowing nothing of its relation to the surrounding world. If the explorer works his way carefully into the new and unknown region, marking and guiding his journeys, he will in time become acquainted with all his surroundings, and finally he can directly find any desired section and can tell whether he finds it in its normal state. This is true in regard to endoscopic study of the nasal chambers, and it is absolutely necessary for the beginner to establish certain and, as far as possible, fixed paths of exploration, never losing compass bearings and always remembering his relations. Until he knows the appearance of every available

field and the path of approach to all these fields in the normal, he has no reason to become discouraged or to discredit the means of search, if he is unable to find and understand the pathologic conditions he may be called upon to diagnose and eradicate.

In practically all walks of life there are several paths, several methods of accomplishing the same results. We find this true in surgery as in other medical branches, and in presenting my technic in rhinoscopy I do not wish to be understood as thinking this the only way or the best method. It is the one I have accustomed myself to use, and now that I have learned it, it is undoubtedly the best for me to follow. What I do wish is that every man, who tries to practice rhinoscopy, would select some fixed and sure method of exploring as much of the whole nasal cavity as possible, never losing the relation of the parts under his immediate vision.

After having acquired proficiency in exploration, we are then ready to begin the handling of instruments under guidance of our right angle vision.

To the laryngologist the ability to carry out this work is quickly acquired, as the manipulations are practically directed as they are by the aid of the laryngeal mirror. Owing to abnormalities of structure the laryngeal mirror cannot always be held in the same manner, neither can the endoscope always be used in the same unchanging manner, and the course I am about to describe cannot always be adhered to, but when it can I believe it, in the abstract, as perfect as we have been able to find.

To go into detail concerning anatomic and pathologic appearances, as seen endoscopically, would take more time than we have at our disposal. The scope of this paper must therefore be limited to only the superficial survey of this work.

In the first place, if there is much secretion in the lower fossa, it should be carefully removed by cotton tipped applicators. Do not use douche or spray, or have the patient blow or clear the nose if it can be prevented. Whenever the mucous membrane is very sensitive or the patient is nervous and apprehensive, it is best to first carefully cocaineize the lower fossa. When the lower fossa is fairly clear pass the endoscope along the floor with the fenestra pointing upwards and

inspect the septum, the inner wall of the lower turbinate, the middle turbinate and the cribriform fossa from front backward until the epipharynx comes into view. After entering the epipharynx, by rotating the instrument to the outer side, the posterior ends of the turbinates are easily examined. By rotating the scope toward the center the posterior edge of the septum is presented for examination. The scope should now be rotated until the window looks upward, when it should be slowly removed. This procedure brings the front wall of the sphenoid, between the middle turbinate and septum, into view, and at the upper limit of this the sphenoid opening is often seen. If it is not, we change our viewpoint by changing the direction of our tube. The proximal eyepiece is carried upward, keeping the tip on the nasal floor. In this position the field is widened by rotating the barrel of the scope. In cases where the middle turbinates are large or where there are polypi or other growth, it is sometimes necessary to carry the tip of the scope by the turbinates and to approach the superior fossa. This frequently will bring the ostium into view. But whenever we change our viewpoint we must always remember that as we approach a field our object appears larger, and when we recede from a fixed and accustomed point the reverse is true. We have not advanced long in this work before these findings are rectified quite subconsciously, and approximately correctly. This must at first be made a mental process, and it is a very important part of our early study.

If, with the tip of our scope in the middle fossa, we direct the fenestra outward, the outer portion of this fossa is brought into view. By withdrawing the scope slightly the ostium of the maxillary antrum is frequently brought within vision. It is often quite a task to find this opening, and considerable jockeying of the tip of the instrument may be necessary. In about forty per cent of all noses examined it is possible to see the ostium of the antrum, and where this is impossible we can examine the mucous membrane which is near the opening, and if this is bathed in secretion or is more inflamed than the adjacent schniderian membranes, we are given more or less valuable knowledge.

Whenever we find pus in any portion of the nose we should try, and, in the major portion of the cases we can, follow it to

its source, either to the sphenoid, the antral ostia, or to the ethmoid or frontal region. In this connection it is important to bear in mind that secretion, whether purulent or otherwise, can be carried by blowing the nose, by douching, or by using a spray. It is also necessary, in cases of profuse discharge, to carefully remove this discharge by cotton applicators before we can form any opinion of the source. With these precautions, when pus is found discharging from a particular sinus, we can be more sure that that sinus, at least, has a purulent infection, than we can by any other sign. Small growths, hidden within the fossa from direct vision, are almost always seen by the scope, and they can frequently be removed under direction of this refracted vision. Wherever situated, it is of the greatest importance to discover malignant disease early. The sponge-like anatomic construction of the nasal and adjacent structures makes it imperative that the disease be early recognized and immediately eradicated if a cure is expected. During the past month a physician consulted me for moderate nasal hemorrhage, which he had experienced several times during the preceding two months. Examination of the septum, the usual site of hemorrhage, showed nothing. There were no signs of disease until the scope was directed into the middle fossa under the left middle turbinate. Here was found a tumor the size of a pea, vascular in appearance and of a granular type. This was removed and found by the pathologist to be carcinoma of a slow growing type. The middle turbinate and ethmoid wall were removed, and apparently the growth was successfully circumscribed. The radiograph showed nothing in this case, as we would expect, and had it not been for the endoscope the condition would not likely have been found until the growth had become of such size as to show below the turbinate. Before such time it would likely have advanced and filled the ethmoid to such a degree as to have been nonoperative. I have seen several cases like the above, and believe when we more carefully examine endoscopically every nose which comes to us, we shall discern these (the most serious conditions the rhinologist is called upon to treat) sufficiently early to thoroughly eradicate a considerable number, and unless recognized and attacked early this condition is hopeless.

Endoscopy is of invaluable aid in our study of the sphenoid region. We can see the opening from the cavity in seventy per cent of all cases examined. If there is secretion discharging from this cavity it can usually be definitely demonstrated. The sphenoid cavity can be syringed under the direction of vision and its capacity accurately measured.

In measuring this cavity the long small eustachian canula is first carried into the cavity through the natural ostium. While the patient's head is held far forward, air is gently forced through the canula. This process removes any secretion within the cavity. The patient's head is now carried backward so that the sphenoid ostium is approximately at the highest relative point. A colored normal salt solution is now carefully forced through the canula from a graduated syringe until it is seen to begin to overflow from the sphenoid opening. The cavity is now full, and the amount of fluid shown to have been used from the syringe is the fluid capacity of the sphenoid cavity. This is an important factor in conditions requiring interference, as frequently the septum, between the sphenoid cavities, is so placed that the roentgenograph gives us little knowledge concerning the two sides.

We cannot go into detail concerning the instrumentation carried out under rhinoscopy, yet it seems advisable to speak of certain points.

First, in most of the endonasal work, the endoscope and the operative instrument have to be used in the same side of the nose. We must remember that blood upon the window of our instrument or between this and the operative field will blur or entirely obscure our vision, and the patient's head must therefore be placed so far as possible in a position that all blood will gravitate away from the tip of the scope. If hemorrhage is not too profuse this can usually be accomplished. It is easier in most cases to have the endoscope placed well down in the lower fossa and near the septum, and the other instrument to the outside and above. In working high up within the middle fossa it is often necessary to carry the operative instrument to the septal side of the scope. In doing this the desired field should be obtained and the eyepiece carried as far to the outside as possible. This allows all the space for as direct attack as it is possible to obtain. When operating

upon the posterior ends of the turbinate or upon the adjacent areas it is usually better to carry the scope through the opposite side, and the operative instrument through the side of the nose to be attacked. Whenever it becomes necessary to remove any of the posterior portion of the turbinate the snare or cautery can be guided throughout the whole procedure by vision obtained through a scope passed through the opposite side of the nose. It is possible to remove the desired amount, and only the desired amount, of tissue by the snare, as we not only adjust the wire loop correctly but we constantly observe its progress through the turbinate while it is drawn into the canula.

The endoscope cannot always be used in endonasal operations, and it is not always better to use this instrument and method of procedure. Much of the nasal surgery is carried out under direct unaided vision, and where this can be accomplished no complicated methods can be better or as good. The important work of this instrument is performed within the areas absolutely inaccessible to direct vision without the destruction of normal important structures, and it seems reasonable to predict that before long some form of endoscopic instrument will be universally employed in all endonasal examinations and in all nasal surgery not possible under direct vision.

XIII.

WHAT IS THE CAUSE OF DEFECTIVE ORIENTATION OR EQUILIBRATION?

BY L. R. CULBERTSON, M. D.,

ZANESVILLE, OHIO.

The great demand for aviators and the large number of men being examined for service has led the writer to consider that it is an excellent opportunity for ophthalmologists and otologists to study deeply into the cause of defective orientation or equilibration.

Several months ago I wrote Dr. C. R. Holmes of Cincinnati, who was appointed to an aviation examining board, if he had the time, to investigate if there was any relation between defective eye muscle balance and defective equilibration from labyrinthine defects.

Over twenty years ago Dr. George T. Stevens, of New York, the pioneer and master of eye muscle defects, began a study of skulls in museums and colleges, and his researches showed that the bony orbits of some skulls were plumb with the horizon and some slanted, and some pitched too high or too low and declined at the same time. From this he drew the conclusion that this would make the eyes incline or pitch correspondingly. He used Helmholtz's haploscopic experiment and invented his clinoscope, which demonstrated that many people had more or less declination of the vertical meridians because the bony orbits were not plumb. He then devised his advancement operation of one or all four of the recti muscles of one or both eyes to successfully overcome this defect. Many people having declinations are subject to dizziness, afraid to go in crowds or high places, etc.

The connections of the eye muscle nuclei and labyrinthine nuclei in the brain are intimate, as we all know.

With the knowledge we have of the orbits being liable to stigmata of degeneration—i. e., inclinations or declinations—

down into the larynx, so that the upper end of the tube is under the finger holding up the epiglottis. The finger then holds the tube in position while the obturator is being removed.

If there is difficulty experienced in attempting to introduce the tube marked for the age of the patient, it is usually due to some edema or swelling in the cricoid ring, which is the narrowest point, or to a transient spasm of the glottis. In such cases a smaller tube may be introduced with slight force. Often our best judgment is put to a test as to when the tube should be removed. I am convinced that it should not be removed sooner than five days, in the majority of cases. If done in less time, before the pseudomembrane has disappeared, reintubation will most likely become necessary. The tube should remain longer if the pseudomembrane persists, and it may become necessary to reintubate a number of times if there are ulcerations about the cricoid cartilages, edema, granulations, abductor paralysis or cicatricial contractions.

The early administration of antitoxin has largely reduced the mortality in laryngeal diphtheria. I believe all cases of membranous laryngitis should be treated at first as diphtheritic and that antitoxin be given as soon as the stenosis is suspected or recognized, and the microscopic and cultural examinations be made afterward. If repeated findings are negative as regards Klebs-Loeffler bacilli, the antitoxin need not be continued; but, if still in doubt, it is best to continue it. If the intubating tube is carefully and gently introduced and the string removed, the presence of the tube is not going to disturb or annoy patients very much, and they are much more comfortable while the antitoxin and other medication are being administered.

The majority of cases intubated can be fed liquid food when in an upright position; but it is most always followed by some cough and, frequently, by complaint of some pain. If feeding in the upright position cannot be done, the Casselberry or Hillis position may be resorted to.

XIV.

SOME SUGGESTIONS ON THE IMPORTANCE OF EARLY INTUBATION AND THE USE OF ANTI- TOXINS IN MEMBRANOUS LARYNGITIS.

BY A. C. WOLFE, M. D.,

COLUMBUS.

In my experience of intubating over one hundred cases of membranous laryngitis, I have observed that most physicians postpone intubation longer than they should. I have always advocated early intubation in all cases of membranous laryngitis, be it diphtheritic or otherwise, because, in a great majority of cases, it will become necessary later, when valuable time has been lost and the patient has lost vitality and is more exhausted.

The chances of recovery are much greater if the operation be performed early than if it be reserved as a last resource, and the younger the child the greater the risk in waiting. If the operation be delayed too long, the engorgement of the lungs, which always accompanies sudden stenosis of the larynx or trachea, leads to bronchitis and catarrhal pneumonia, and is thereby liable to bring about a fatal result. If left until all other treatments have failed and systemic infection is marked, a sudden and even a complete oxygenation of the blood will not restore the normal condition, and the patient will succumb to the intense toxemia.

My experience has convinced me that the accident of placing the tube in the esophagus, which often happens to those who are not familiar with the operation, is due to the fact that the handle of the introducer is not lifted high enough so the distal end of the tube points toward the mouth of the larynx instead of the esophagus. The distal end of the tube should come against the left forefinger holding up the epiglottis, which also aids in directing the tube. The tube should not be forced into the larynx, but should drop into it of its own weight, well

it would lead us to the supposition that the labyrinth (internal ear) might have the same defect (i. e., not being plumb with the vertical or horizontal plane of the body or the horizon). If it were not plumb, I believe that the person would be subject to faulty equilibration. How would we know this? The only way to tell would be to remove the entire temporal bone from the head of the dead subject whom we knew to have been through the Bárány tests and known to have faulty equilibration from either eye muscle or ear defects or both; take the bone, get the plumb of the upper ridge of the petrous portion and the zygomatic root, then cut the bone open and see if the semicircular canals were plumb with spirit level. This would have to be done by an expert anatomist.

To determine whether defective equilibration were due to tilting (declination) of one or both labyrinths, both would have to be examined pathologically to determine whether there were any pathologic defect due to syphilis, measles, scarlet fever, etc., or blood vessel defects.

Another thing that would have to be determined would be whether one leg was slightly longer than the other and the amount, and take that amount and figure how many degrees of a circle that would cause in inclination of the body side-wise. Then ascertain if the labyrinths have inclinations to a similar degree; or whether the labyrinths are plumb with the earth's vertical plane, even if one leg is shorter than the other.

I advance these theories in the hope that some able scientific investigators may be able to elucidate this problem.

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NASAL AND NASOPHARYNGEAL FIBROMA, WITH A REFERENCE TO MULTIPLICITY OF GROWTHS.*

BY GEORGE MORRISON COATES, A. B., M. D.,

It was not the intention of the writer, in undertaking this thesis, to review the whole subject of fibromata of the upper air passages, since most exhaustive treatises have appeared, many of them in the Transactions of this Society, during recent years. Such treatises have given extensive bibliographies and discussions on the etiology of these peculiar neoplasms, the different modes of combating them and on their well known tendency to recur, and, now, equally well known tendency to disappear at a certain period in the development of the afflicted individual. In the review of a recent case of my own, incorporated herein, the writer was forced to the conclusion that he was dealing with a definite multiple growth, evidently a rare condition, and hoped by a review of the literature to substantiate his position. Such a search, however, failed utterly to bring to light a single report where more than one neoplasm that could be indubitably classified as a true fibroma had been found at one time in a case, so that a discussion of duality or multiplicity of growth from this standpoint is barred and can only be taken up on the ground of the case presented. During this search the literature of the subject was reviewed during the last few years without the discovery of very much that was new or at variance with opinion quoted a short time back in the essays referred to above. For the most part these monographs consisted in case reports and continuations of the older discussion as to the etiology, the advantage of the external route, the transmaxillary route or the natural passages as the approach for operative removal, and the arguments pro and con in regard to electrolysis, injection, avulsion, etc. These will be briefly summarized later.

*Candidate's thesis to the American Laryngological Association. 1917.

The case that drew the attention of the writer recently to this subject appeared to him to be a case where there coexisted in the same patient a nasal and a nasopharyngeal fibroma as distinct and separate entities. There is a doubt expressed in many papers as to the similar nature of fibromata when found in these different locations, and some authors even go as far as to say that nasal growths are really but nasal prolongations of the nasopharyngeal tumor, and vice versa. It is taken for granted here that it is an accepted fact that true fibromata dura may be found with their insertions in either cavity, thus constituting a true nasal or a true nasopharyngeal fibroma, as the case may be, exclusive of the often noted fact that prolongations of the original tumor may and frequently do, invade neighboring cavities and form more or less dense adhesions there, sometimes simulating true attachments. In fact, one case is on record by a most competent observer, Richardson,¹ where there were two distinct pedicles in a case of the nasopharyngeal type operated upon by him.

As before stated, there are few allusions even to the possibility of there being more than one growth in a given case. Ballenger,² indeed, says such tumors are "usually" single, and Pierce³ makes the statement that they are "never" multiple, although they frequently form secondary attachments by pressure erosion and adhesion. Wells⁴ uses the term "fibrous polyp" for the more characteristic one of fibroma and says these tumors "occur as a rule singly," and that they seldom recur. This latter statement hardly agrees with the generally accepted view, where the tendency to recurrence is one of the three cardinal causes of failure to cure by operation, the others being hemorrhage and death during operation. He also notes a tendency to "infiltrate" surrounding bone cavities. It is well known that absorption by pressure of neighboring bony structures is often caused, as well as invasion of cavities through the natural ostia, but infiltration of the bone is a characteristic of true malignancy. The above mentioned writer reports three cases removed without difficulty with the cold wire snare. Two of these cases were in girls, which lays them open to the suspicion of not being true fibromata, and in one of these the pathologic diagnosis was a "fibrous polyp," while in the other it is not given. Moreover,

in the last case (the one diagnosed as "fibrous polyp") four large masses were removed. This is the only case which has been found in which more than one growth was present, and in this there seems to be a reasonable doubt whether these four masses were traced to separate and distinct pedicles and, if so, whether they were not in reality mucous polypi presenting much fibrous tissue.

I wish here to protest against the continued use of the term "fibrous polyp" as applied to fibromata. It is not histologically correct, since these tumors have no etiologic, clinical or histologic relation to mucous polypi, which by common consent are now understood to be meant when the term polyp is used; their only point of resemblance being the pedunculated form that they sometimes assume. In searching the literature, one is constantly misled by the use of this term, when a study of the article shows finally that a fibroma was meant, or not meant, as the case may be. Since there is such a pathologic condition as a true mucous polyp showing fibrous change, the term should be confined to descriptions of these, and much confusion would be thereby avoided. These are by no means uncommon, but their course and treatment are entirely different and relatively simple.

Stucky⁵ has never seen a case exhibiting a multiple growth, although many are lobulated, nor has he seen any fibroma which any cold snare would cut through; while Lincoln,⁶ reporting a case of nasopharyngeal fibroma removed by external preliminary operation, remarks that such growths are comparatively rare, "arising in the nasal chambers and unaccompanied by similar growths in the nasopharynx," thus by inference suggesting that they do at times occur in combination. So much, or rather so little, have I been able to find concerning multiple growths.

There are some points of interest in regard to the etiology and, in particular, to the point of insertion of these growths, in reference to a distinction between the nasal and nasopharyngeal type of these neoplasms, many observers holding the view that they are two distinct types of growth. Thus Getchell⁷ states his belief that nasopharyngeal fibromata should be classified as being distinctly different from nasofibromata. He bases this belief on the well known facts that nasopharyngeal

fibromata almost invariably occur in young males near the age of puberty and have a marked tendency toward recession at about the age of twenty-five, if the patient does not succumb before that age is reached. Nasal fibromata, on the other hand, are found in either sex and more often in those past middle life. Wright⁸ states the commonly accepted fact that nasopharyngeal fibromata have their origin in the dense fibrous tissue and periosteum on the under surface of the basilar process of the occipital bone and the body of the sphenoid; and Getchell believes that many growths now classed as nasal should be put in the former class, although their origin is from the face of the sphenoid or the sphenoethmoidal recess. One of the two cases reported by him had such an origin. Casselberry⁹ draws a marked line of distinction between these two types. Most of the cases reported by him occurred after the age of twenty-five, in contradistinction to the early age at which nasopharyngeal fibromata appear and disappear. Chamberlain¹⁰ calls attention to the above mentioned distinction and to true "fibrous polypi" (not fibromata), and quotes Zarniko showing that they are two distinct entities. He reports four cases operated upon, three successfully and one with recurrence, but suggests that only two, being sessile tumors, came within Zarniko's classification as true nasopharyngeal fibromata. From the descriptions given, however, it would seem that the two pedunculated tumors were of nasal origin, since the histologic diagnosis was true fibroma in each case. Four cases in the hands of one man in a comparatively short space of time is a larger number than happens to most laryngologists.

Many observers believe that the true nasal fibroma is a rare growth. Casselberry, quoted above, reports a case of nasal fibroma in 1898, successfully operated upon by him, and comments upon the generally considered rarity of the condition, although he adds two authenticated cases collected from the recent literature of that time, and many more have been added since. While for many years the effort was constantly put forth to prove that all these fibrous growths had the classical origin assigned to them, namely, the base of the sphenoid, the basilar process of the occipital and perhaps the two upper cervical vertebra, and that nasal growths were but extensions from these, in recent years there is a marked tendency to take

the opposite view and give all fibromata a nasal origin with the nasopharyngeal masses as being merely secondary. Thus Herbert Tilly¹¹ thinks that most of these growths are "post-nasal," in that they spring from the sphenoethmoidal recess rather than from the vault of the pharynx; and while Moore's¹² case had a very broad nasopharyngeal attachment, yet when this was liberated, the growth apparently had its insertion where Tilly believes they always arise. Uchermann¹³ has removed a number of these tumors by the transmaxillary route. He believes that in operating in this way he has discovered that the insertion is usually, if not always, from the face of the sphenoid and the sphenoethmoidal recess, the tumor spreading thence into the nasal chambers, accessory sinuses or into the nasopharynx, and that all other attachments are secondary and due to adhesions. This is certainly contrary to the generally accepted idea that those growths classified as nasopharyngeal spring from the occipital bone and the upper cervical vertebra, although he is supported in this view by D. Jacques.¹⁴ This author says that until recently opinion was almost unanimous that the origin was always from the basilar process of the occipital bone and the two upper cervical vertebrae, and that all other points of attachment were adventitious: that the tumors only secondarily invaded the cavities of the face.

Jacques argues from the history of many of these cases that as one choana is usually obstructed before the other, the growth must have its origin in one nasal chamber, and supports this view by reports of eight cases studied and operated upon by him, in each one of which he found the true attachment in the sphenoethmoidal recess or on the face of the sphenoid. In corroboration of this view he quotes Texier, Raoult, Moure, Latour, Gautier, Duverger, Beca, Lafitte-Dupont, Castex, Escat, Sieur and Gaudin. He seems to believe that all fibrous tumors spring from the nasal passages and that the attachment to the occipital bone and cervical vertebra so commonly found are merely adhesions. Such adhesions can be easily separated, while the true insertion invariably is to the bone, and bony spiculæ are removed with tearing away of the growth. Jacques and Escat also note

the predilection of these tumors for the left side, a fact I have not seen noted elsewhere.

It seems to me more rational to believe that these tumors may have their origin either in the nose or nasopharynx, and that they are identical except in the location of their point of insertion, and this in spite of the apparent differences of age and sex in which they occur. Certainly a tumor of the nasopharynx, with prolongation into the nasal chambers, as reported by Ballenger and many others, must not be classed as a nasofibroma or, vice versa, one arising from a nasal insertion with a nasopharyngeal extension, adherent or otherwise. As a matter of fact, many of these so-called nasal fibromas are not true "hard" fibromata at all, but polypi showing a large amount of fibrous tissue, fibrous polyps, as they are often and truly called. These have their origin in sinus disease and are misleading unless a careful microscopic study is made. Several times I have thought that I had cases of fibroma dura until undeceived by the microscope, and the literature abounds with reports of such cases.

There is a very definite belief that neoplasms of the nasopharyngeal type show a marked tendency to atrophy and disappear after the patient reaches early adult life, if indeed he can succeed in living that long. Cases reported by Ingals¹⁵ and Swain¹⁶ of vascular sloughing fibromata bear this out. In their cases numerous terrific hemorrhages took place after spontaneous sloughing of parts of the tumor, and after each one the tumor decreased temporarily in size, only to take on renewed activity and growth until, for some reason, the limit was reached with the eventual disappearance of the neoplasm forever. But, of course, in these cases much irreparable damage was done, although the mere fact that life is saved may always be considered a satisfactory result. In Ingals' case, where there was present a large nasal extension of the tumor of the vault, operation failed to prevent recurrence, but there was spontaneous absorption in a few years. Great damage had in the meanwhile been done, however, including the loss of sight in one eye, which emphasizes the fact that one cannot afford to allow these patients to go untreated for more than a short time in the hope of a spontaneous cure. That atrophy does not always take place at or about the twenty-fifth year,

and yet may do so later, is illustrated by a case of Pierce's, of nasopharyngeal tumor in a male of thirty-one years, which disappeared under observation by spontaneous involution. A number of similar cases are cited by this author, and Gibb¹⁷ makes the same assertion, so that there are many in accord in the belief that spontaneous disappearance should not be waited for in other than exceptional cases, as the risk of damage or ultimate failure to atrophy is too great. Holmes,¹⁸ on the other hand, writing in 1902, had observed spontaneous reabsorption in two cases at the early age of twenty-one, after operation had been unsuccessful in preventing recurrence due to inability to entirely eradicate the mass. It is with the hope of such a spontaneous cure in mind that the injection treatment advocated by Harmon Smith¹⁹ and others probably had its greatest value. Smith has had signal success in coping with this condition by injections of monochloroacetic acid, and lactic acid has also been used successfully. He reports two recent cases thus treated with decided reduction in size of the tumors. Other operators have reported similar results, although the method does not have very general support, due to the fear of hemorrhage from the sloughing masses. Where a tumor is causing much distress and it is desired to carry the patient a short time, hoping for a spontaneous cure, much may be accomplished in this way.

The probability of recurrence is universally recognized, and the main object of a complete removal is to minimize this danger. McBride²⁰ states the general opinion of the profession that the greatest probability of recurrence is when a stump is left and many efforts have been made to eradicate this stump by caustics, electrolysis, radium, etc., all more or less successful at times. Reports of recurrences are numerous in the literature, as reviewed above by Holmes, due to inability to entirely eradicate the base. Kelson²¹ comments on a case of his own, where recurrence took place two and one-half years later, and Horne, in discussing this paper, says that the mother part of the tumor must be gotten away, for such tumors at times kill by metastasis. While this latter statement is undoubtedly true of fibrosarcomata, a closely allied neoplasm, it is not generally accepted as applying to true fibromata. That such recurrences may be long delayed is empha-

sized by Lamberk Lack,²² whose case went without recurrence for twelve years, only to show renewed growth after that time.

The chief obstacle to a complete eradication of the insertion is profuse hemorrhage at the time of operation, and this varies very much in different cases, due probably more to an increased vascularity in certain growths than to the mode of removal, although this is a very important factor. Many share the belief of the writer that if the growth can be torn away at its very insertion, which is not always possible, the hemorrhage will be less than if the stump is left, making it impossible for the blood vessels to retract. Richardson and Gibb, quoted above, are in accord with this view, and Stucky finds that the growth can be loosened, during avulsion, by rocking as a dentist does a tooth before final detachment. Both Gibb and Richardson are on record as believing that if the growth is removed completely and with its attachment, there is little danger of extensive bleeding. Although doubtless this is true in many cases, yet there must be many where the bleeding is profuse in spite of thorough removal, and thorough and quick removal is not always, or even often, easy of accomplishment in large tumors with extensive attachments, either primary or secondary, and with numerous prolongations.

Delavan²³ has again called attention to his position, taken in earlier papers,^{24 25} that the old method of removal, practiced by the general surgeon, by extensive preliminary operation, is unjustifiable in view of the results obtained by Voltolini and Lincoln²⁶ by the use of electrolysis and the galvanocautic snare, and by Doyen, with his operation for removal by the natural passages. The technic of these operations has reduced the previous high mortality to almost nil, and these are the procedures now in almost universal use in the American and French schools. A review of British literature of recent years, however, shows that the tendency there is still to consider the formidable external operation, preceded by tracheotomy. If removal is attempted *per via naturales* and without the aid of electrolysis, avulsion in some form or the use of the cold wire snare where possible, seems to be the procedure of choice in this country.

A case history is appended which illustrates some of the points discussed in the preceding brief review. It seems to the writer to be unique, if his belief is correct that there were coexistent nasal and nasopharyngeal growths present. The other features of the case are commonplace, although every case reported helps to swell the record of what is, after all, not a common condition. A period of four months is too short a time to infer much in the way of immunity to recurrence, but it is at least something gained.

HISTORY OF CASE.

This case that came under my observation recently, seemed to me to present sufficient interest to warrant a brief report and comment on fibromata of the upper air passages.

Jacob W., age fifteen years, presented himself at the Out-Patient Department of the Pennsylvania Hospital on December 8, 1916, complaining chiefly of nasal obstruction. He was somewhat underdeveloped, although not flat chested, had a moderate degree of anemia, and a sallow, unhealthy complexion. Mentally he was well developed for his age and condition, though presenting evidences of aphrosexia. Nasal breathing was almost entirely absent, a very small amount of air being forced through the left nostril on forcible expiration. The nose was prominent and broad at the base and toward the bridge; the mouth open; jaw relaxed; chin somewhat underdeveloped.

According to the history given, he had none of the diseases of childhood except measles. He had been healthy and not a mouth breather until about five years previously, when, at about the age of ten, he began to suffer from nasal obstruction, most marked on the right side. This was diagnosed as due to an adenoid growth, but operation was refused. Nasal obstruction progressed, and in the course of a couple of years became almost complete. He had no epistaxis, the ears were practically normal, had no headaches in particular, but had a great deal of nasal discharge, which he was unable to rid himself of by blowing because of the obstruction.

Nasal examination showed the septum markedly deviated to the left posteriorly, crowding against the left turbinals and occluding the inferior and middle meati. The right inferior turbinal was enormously hypertrophied anteriorly and the right

middle very considerably so. A view of the posterior portion of the right nostril could not be obtained. By posterior rhinoscopy, the nasopharynx was seen to be filled with a hard, grayish red mass that had the characteristic appearance of a fibroma, and this diagnosis was made. The tonsils were small and the walls of the pharynx dry and covered with thick, tenacious, yellowish mucopus.

On December 15th, a partial resection of the large right inferior turbinate was done after failure of refraction to give an adequate view of the posterior part of the nasal chamber. A large low spur was now discovered projecting from the right posterior portion of the septum. A good view of the posterior portion of the right naris being now obtained, the choana was seen to be filled by a fibrous mass, apparently having its origin in the sphenoethmoidal recess and extending backward through the choana. This I believed to be either a nasal extension from the pharyngeal growth with adhesions in the nose, or a nasal fibroma extending into the pharynx with adhesions there, for this latter portion seemed to be attached to the bodies of the upper cervical vertebra. Manipulation through the nose with a probe, however, indicated that the upper or nasal growth, or portion of the growth, was distinctly pedunculated. Exact determination of points of attachment was impossible on account of the size of the mass and its closeness to adjacent structures, the septum being markedly deflected to the left by its presence. Following the turbinectomy several weeks were allowed to elapse to get rid of the bleeding and scab formation, which was very annoying, to study the tumor and to attempt to check the suppuration and inflammation in the nasal chambers and nasopharynx in order to have a cleaner field for further operative procedures. On February 1st an attempt was made to snare the nasal growth through the nose, a light, cold wire tonsil snare being used but without any success, as the wires either broke or pulled out of the eyelets. The growth was, however, easily encircled and appeared to be distinct from the pharyngeal mass. These attempts were made under local anesthesia. A week later, on February 8th, the patient was placed in the ward, and on the 9th a further attempt to remove the fibroma was made under warm ether vapor narcosis. A large, powerful Lewis tonsil

snare carrying the heaviest piano wire (Numbers 9 and 10) that could be threaded into it, was passed through the nose as in the previous attempt. The loop was carried into the pharynx and directed around the sessile pharyngeal growth with the finger in the mouth. Even these heavy wires, twisted and tied into the eyelets, simply pulled out straight, without leaving so much as a mark on the tumor. The same thing occurred when the growth was attacked through the mouth with the aid of a palate retractor, and also when the pedunculated tumor was encircled. Altogether six wire loops were spoiled, when success by this method was depaired of. With all preparations made to stop hemorrhage and to perform a tracheotomy, the pharyngeal growth, which appeared to be attached to the bodies of the cervical vertebræ upward to the basilar process of the occipital bone and extending from side to side of the pharynx and to the lower border of the velum palati, was seized with a very heavy, powerful modification of Löwenberg's adenoid forceps, and, both hands locking the handles, with a rocking, wrenching, twisting motion and using a great deal of side force, the growth was detached after about five minutes' continuous work. Scarcely any bleeding followed. The growth measured 3 by $4\frac{1}{2}$ by 2 centimeters, and was complete and covered uninterruptedly with mucous membrane, except on its large flat posterior surface where its attachment was. This raw surface showed fibrous bands and fragments of periosteum where it had been avulsed from the vertebræ and the occipital, and the finger in the nasopharynx easily felt denuded bone in several places. The operation was now considered finished, as it was thought that the whole tumor mass had been delivered at once, but the little finger of the left hand forced through the right nostril and meeting the forefinger of the right hand through the mouth at the right posterior naris detected a pedunculated tumor still partially occluding this orifice. Again an attempt to snare this failed, and again the forceps were used through the mouth, being now guided by the finger in the nostril. The growth was seized and avulsed as in the previous procedure when, to my surprise, a mass almost identical in size and shape to the one first removed was delivered, the only difference being that this second growth had a small pedunculated area of attachment.

No portion of either growth showed any place where it could have been attached to the other, so that I was forced to conclude that I had been dealing with two distinct and separate tumors. The right nostril was now entirely patulous, and the finger in the nasopharynx found a large cavity to the right of the median line in the sphenomaxillary fossa, the limits of which could not be reached, and which was apparently caused by the pressure backwards of the nasal growth. My impression from this examination was that there was some absorption of the basilar process of the occipital and of the sphenoid, but subsequent X-ray studies failed to substantiate this. Although the hemorrhage was slight, the nasopharynx and right nostril were tamponed with gauze soaked in tincture of iodine and tincture of benzoin for twelve hours. The ether anesthesia, being skillfully given, had been light, and the patient reacted promptly and without shock, breathing easily through both nostrils on the removal of the packing. Since that time he has done well and there is so far no suggestion of a recurrence. He breathes easily through the nostrils at all times and keeps his mouth shut, even at night. His color has improved, he walks erect with his shoulders back instead of hunched forward as formerly, the froglike appearance of his face is disappearing, his eyes are bright, appetite good and he is working. His only annoyance was that every morning a large bloody crust came away from the nasopharynx for the first two months, but that has now ceased. He is rapidly gaining in weight and strength. After some weeks the area of denuded bone had granulated over, but had not been entirely covered with mucous membrane. There is a tendency on the part of the amputated right interior turbinate to hypertrophy, as I have seen occur in some cases of atrophic rhinitis when the ozenatous process has been arrested by vaccine, and the deviation in the septum is less apparent now that the pressure on its right side has been removed, thus allowing more air space on the left. It seems, however, that the left choana as well as the right was blocked by one of the fibromata. Nearly four months have elapsed since the operation.

The report on the specimens by Dr. A. G. Ellis, of the Ayer Clinical Laboratory of the Pennsylvania Hospital, was that they were pure hard fibromata.

The interest in this case seems to lie, first, in the presence of more than one growth; secondly, in the typical shape, position and attachment of each growth; thirdly, in the difficulty of removal by the cold snare, but the facility with which they were removed by avulsion; fourthly, the apparent completeness of removal, and lastly, in the almost entire absence of shock or hemorrhage, despite the rough manipulations. I will briefly discuss these points in detail.

1. Although I believe the presence of more than one true fibroma in an individual is a rare condition, I am compelled to believe that it existed in this case. On reviewing the results of the early nasal examination as outlined above, this seems to be somewhat clearly indicated, and the fact that two large masses were removed by avulsion, each having widely different attachments and without any visible evidence of having been attached to each other, makes it almost certain, for I cannot conceive of any force that could be applied that would have torn any portion of these growths away from the main body. Indeed, so tough were they that the snare wires did not even leave a mark, and the scissors on my instrument table failed to cut them after their removal. I am sure that, had they been parts of the same growth, that the second would have been delivered with the first.

2. Another reason for believing them separate entities is the shape and position of each. The nasofibroma had its attachment in the region of the sphenoethmoidal recess, a common situation for such growths, and moreover it was very distinctly pedunculated, the body of the tumor pressing the septum to one side and then extending backward into the vault of the pharynx and the sphenomaxillary fossa. On the other hand, the pharyngeal fibroma occupied the typical position for such a growth on the anterior bodies of the upper cervical vertebræ and the basilar process of the occipital bone. The attachments in each case were the periosteum, which stripped off, leaving large areas of denuded bone, which indicates that they were not adhesions caused by pressure and erosion. Aside from the fact that the area of attachment in the nose was small and in the pharynx large, the two tumors were almost identical in size and shape, the nasal being, if anything, the larger and having a rather small prolongation or neck.

3. The hardness and toughness of the tumors, aside from the histologic diagnosis of fibromata dura, would easily exclude the so-called soft fibroma or fibrous polyp, which is frequently multiple but which is simply an ordinary mucous polyp that has undergone some fibrous change. These latter are easily removed with the cold wire snare, but a true fibroma rarely can be, although I thought it might be done with a very powerful instrument. The avulsion was accomplished by exerting considerable force in different directions and finally twisting the growths loose, and doing the whole thing slowly.

4. The tumors were apparently removed root and branch, as an examination of their bases showed periosteum, and in no other place was the smooth surface broken; an examination of the nose and pharynx failed to reveal any evidence of a stump remaining. Avulsion, therefore, when it can be practiced, seems to me more ideal in this respect than the use of the galvanocautery, snare or sharp cutting instruments, since these of necessity frequently leave the base of the tumor behind, from which it may recur.

5. The absence of shock I can only attribute to the very careful and skillful way in which the anesthetic was handled, the patient being just sufficiently "down" to be quiet and unconscious, and to the avoidance of very direct or sudden pulling on the forceps. Instead, minutes were consumed without relaxing the tension for a second, and the tumors slowly and gradually loosened, as suggested by Stucky, and finally torn away. Of course, the points of attachment and the small amount of absorption were probably great factors. I saw one case a few years ago, in the hands of a very skillful colleague, which died on the table just after the avulsion of the growth. This case has been reported. The anesthetic was not nearly as well administered as in my case, and I always felt that the cause of death was largely attributable to the anesthetist. Milligan²⁷ cites a case of his own where an unexplained death occurred shortly after an otherwise successful operation for removal. The almost total lack of hemorrhage in my case, I think, was due to the slow avulsion and twisting loose of the tumors, to the fact that the entire tumor masses were removed intact and to the added fact that they were so very dense and therefore not very vascular. Where portions of a fibroma are

left it is reasonable to suppose that the severed arteries cannot retract, just as was frequently seen in early tonsillectomy operations where portions of hard, fibrous tonsils were left in situ. In these cases the hemorrhage almost invariably ceased when the remainder of the tonsil was excised.

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XVI.

LINGUAL ABSCESS.*

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Within the past year I have seen two cases of tongue abscess, one an acute, the other a subacute or chronic. In my survey of the English writings I was able to find but very little in the texts or current literature dealing with this subject. The following are a few of the texts and what they have to say on this subject:

"American Practice of Surgery," by Bryant and Buck: "Chronic abscesses are generally secondary to trauma, syphilis or tuberculosis. They are circumscribed, less prominent than cysts, not painful or tender, and usually situated in front of the circumvallate papillæ. In doubtful cases insert exploratory needle."

"A Treatise of Surgery," by Geo. Ryerson Fowler: "Abscess of the tongue is usually the result of a breaking down of a gumma situated in the median line and usually pursues a chronic course."

"Practice of Surgery," by Walter Geo. Spencer: "Sub-acute abscess may be set up by the bite of a tooth or foreign body and may be confused with gumma, tuberculosis, actinomycosis and cancer. Should be incised and its contents and wall examined."

"Manual of Surgery," by Rose and Carless: "Usually of a chronic nature, situated in the anterior part of the organ. Due to admission of microorganisms through some superficial lesion which has quickly healed. It presents as a tense swelling. Free incision settles diagnosis and cures case."

"System of Practical Surgery": "Chronic abscess rare. Due to swelling which has been circumscribed from the begin-

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ning. In some cases reported are undoubtedly confused with suppurating actinomycotic nodules."

"Surgical Diagnosis," by Albert Berg: "Chronic abscess very painful and fluctuates."

"Surgical Diagnosis," by Alexander Bryan Johnson: "Indicated by severe septic symptoms, high fever, rapid pulse. Localized pain and tenderness. Sometimes fluctuation can be felt from floor of the mouth, less commonly upon the dorsum of the tongue. Fatal cases from general sepsis or aspiration pneumonia have occurred."

"Keen's Surgery": "Acute abscesses not very common, may occur in the course of an acute diffuse parenchymatous glossitis, although it seldom does. There are two forms of the acute, the superficial and the deep. The acute superficial occurs usually at the dorsum of the tongue toward the base, invariably in front of the circumvallate papillæ. Deep acute abscesses may arise during the process of acute parenchymatous glossitis. Sometimes found in true mercurial glossitis. May follow infliction of a puncture wound or entrance of foreign body. When abscess forms, the pus is so deep that fluctuation is never an early symptom. Such an abscess may be taken for a gumma unless preceded by acute general glossitis."

After a résumé of these writers I felt this subject should be worthy of our consideration.

I believe the reason for this organ being so seldom affected by such a process is due to its wonderful blood supply, which makes it very resistant. Dr. Jos. Prenn suggests that the abundant various organisms harboring in this region probably establishes a local immunity. Abscesses, I presume, can form in any part of the tongue, but in the cases reported and in my cases, they were in the base of the tongue.

The cause of these abscesses is vague, but I believe some form of trauma, which lowers the resistance of this organ, and the virulence of the invading organism is the most logical etiologic factor.

The symptoms will vary as to the location of the abscess, the length of time it has existed and whether it is an acute or a chronic process. Wright and Smith say the chronic form usually occurs at the base of the tongue near the center, and

may exist for years without symptoms except for a sensation of a foreign body, cough or a feeling of difficulty in swallowing. This coincides with one of the cases I will report.

The acute cases are characterized by a gradual onset, pain in the throat, and in the tongue when moved, which may be referred to the ears or down the neck. The tongue is swollen at its posterior part and very tender when pressed upon by the tongue depressor or palpated. The patient usually has chills, and fever ranging around 101. The cervical lymphatics are swollen and tender, speech is interfered with and painful. Edema of the surrounding structures may be present, depending upon the virulency of the process. Respiration may or may not be impeded. The patient refrains from eating because of the pain in swallowing.

The chronic form has the character of a circumscribed cyst. There may or may not be pain, but if present it is slight and the tongue feels stiff and awkward in its movements. There is the sensation of something being in the throat, and the patient tries to swallow it or cough it up. A local swelling may or may not be apparent on the surface of the tongue. There is no interference with deglutition. The chronic abscesses never attain a large size, usually about the size of a hazelnut. History as a rule is vague.

The prognosis in the acute cases should be guarded; whether the abscess be opened or not, serious complications may follow. The chronic cases are usually favorable.

The diagnosis may or may not be easy and will depend upon the stage in which the patient is observed and the clinical manifestations. In the acute cases one is liable to attribute the condition to a glossitis.

The patient refuses to open the mouth very wide in some cases because of pain. The posterior part of the tongue will be swollen while the anterior part is apparently normal. Extreme tenderness to pressure over the swollen area; if fluctuation can be determined will assure one of a positive diagnosis.

The diagnosis of the chronic cases will be more difficult, and I believe many of these cases go undiagnosed and called globus hystericus. I transilluminated both the cases I had with the pharyngoscope, placing it under the tongue and well back on both sides, and saw a well defined dark area which

localized the abscess in both the acute and chronic case. I do not mean to convey the idea that this is evidence of an abscess, but another link in the chain of findings. If the tongue was greatly swollen this could not be done. A cyst will not be tender on pressure—there will be an absence of pain, and the introduction of an aspirating needle into the swollen mass will verify the diagnosis.

A deep seated parenchymatous gumma, usually located in the dorsal aspect of the tongue, can be felt as a round or oval tumor—very indolent—producing little or no pain and not tender to handle. Multiple gumma is more common, but may fuse and then become an irregular mass. It usually breaks and produces ulceration, but may remain unulcerated for years. Wassermann, clinical signs, and mixed treatment will make clear the diagnosis. Actinomycosis, tuberculoma, lipoma, lingual goiter, fibroma, sarcoma and carcinoma will have to be differentiated from the chronic abscess formation, but the history, clinical and microscopic findings will clear up the diagnosis.

The treatment will resolve itself into draining the abscess, which can be done by an incision with a long curved bistoury, through the long axis of the tongue into the abscess cavity. Dr. J. V. White of Detroit and Dr. James Prenn of Boston, in the cases they reported, made the incision under the tongue at the side and parallel with it. If the posterior part of the tongue is greatly swollen this area will be more accessible. In acute cases the patient should be under constant observation and should be placed in a hospital and a tracheotomy done if necessary. I do not believe palliative treatment should be resorted to after the diagnosis is made.

The following cases will illustrate these two types of abscesses more clearly:

On the morning of April 5, 1917, I was called to the home of Mrs. K. M., aged twenty-seven years. She was in bed in a semisitting position. Her color was good, but she had an expression of anxiety. Speech seemed to be difficult and breathing rather labored. Temperature, 101; pulse, 120; respiration, 24. No apparent swelling of the neck, but palpation caused the patient to flinch and say it was painful; cervical glands enlarged. When asked to open the mouth

did so slowly, and opened it about half way, saying it hurt to open wider. Marked coated tongue; when asked to protrude it did so slightly, complaining of pain. Anterior half looked practically normal in size, but the posterior part was swollen about twice its normal size and very tender to pressure. The tonsils were swollen and débris present in the crypts. Some edema of the uvula. With a laryngeal mirror I was able to elevate the palate and examine the base of the tongue. The epiglottis was swollen about twice its normal size and pushed back over the laryngeal opening, so I was unable to see into the larynx. I did not try to pull the epiglottis forward, as I thought any manipulation might tend to increase the edema. Palpating the mass, I was sure I could ascertain fluctuation. She was eight months pregnant. Present trouble started about one week before; had a stiffness of the neck and throat, and used the ordinary home remedies for three days, but did not improve. She could not talk well and it hurt to eat, so she went to see her family doctor who said she had tonsillitis and treated her for the same.

She went to see him again in two days, as her condition seemed to be growing worse. He painted her throat with medicine and told her to continue the treatment. That night she had a choking spell and could hardly breathe. The family doctor was called, and he recommended hot applications for the neck and a gargle. The next day her condition was worse and the family insisted on consultation. The doctor then gave antitoxin and suggested waiting. The following morning I was called.

Previous History.—Patient has always been in good health except for sore throats. Was married last July.

Family History.—Father and mother living and well. She has four brothers and three sisters living and well; one sister was drowned in the Eastland disaster.

I ordered the patient sent to the hospital, and on the afternoon of the same day I operated. She could not lie down, so I had her retain the sitting position and applied crystals of cocain to the surface of the abscessed area. Having done this, I placed my index finger of the left hand back beyond the mass; then followed with a curved scalpel, making an incision in the posteroanterior direction and in its center. A large

quantity of pus and blood was expelled, and the patient said, "Oh, I feel better." I then made a couple of incisions into the anterior surface of the epiglottis because of the marked edema. Breathing was better, and the patient coughed up a great deal of mucous. She was taken back to bed, and an ice pack applied to the neck. She could not lie down. I ordered instruments ready in case of an emergency tracheotomy, and remained at the hospital to see how she would respond. In half an hour I was called to the room and found the patient gasping for breath. I inserted my finger into the throat and pressed the epiglottis forward. A considerable thick mucous was coughed up, and again she felt better. This occurred three or four times, when it failed to give relief, and the patient became cyanotic. Then I did a rapid tracheotomy, introduced a tube and fed the patient oxygen. She quickly recovered. I made a tent over her bed and kept up continuous steam vapors.

The following morning, April 6th, the patient was feeling very good—temperature, 100; pulse, 130; respiration, 28. That evening she began to have labor pains—temperature, 102; pulse, 140; respiration 32. The family doctor was called and he pronounced the baby dead, and advised watchful waiting.

The following morning, April 7th, I removed the tracheotomy tube and closed the wound, and the patient continued to breathe without difficulty, so I pulled the wound together with adhesive. Labor was induced that morning, and about eleven o'clock I received word that the doctor had delivered a six pound baby girl alive and in good condition. From that on temperature, pulse and respiration gradually returned to normal, and mother and baby left the hospital April 19th, two weeks from the day of entrance.

Cultures were taken in broth media and blood agar. The broth culture showed a cloudiness of the media in eight hours. The blood agar showed a culture present in six hours. A plate blood agar showed hemolysis.

The next case: Miss B. H., aged twenty-nine years, consulted me at my office August 28, 1916, complaining of the feeling of a lump in her throat, which she would try to cough out and swallow. Each time she swallowed it seemed to feel better, but only for a second; otherwise she had no discom-

fort. Gave a history of syphilis and having had salvarsan a couple of times. She had a pyonephrosis of the left kidney. Was quite nervous and restless. A blood Wassermann reported negative.

Tonsillar glands were slightly palpable, no tenderness; teeth apparently in good condition; tongue freely movable, but patient said it felt a little stiff. Tonsils small and apparently innocent. No lymphoid enlargement at the base of the tongue or dilated veins. Epiglottis negative, hypopharynx and larynx negative; some small glandular enlargements on pharyngeal wall. Postnasal space negative. I gave her a placebo and had her return in about a week, when I introduced an esophagoscope into the esophagus, but found nothing. I told her to use steam inhalations and apply ten per cent argyrol to throat twice daily. I made my diagnosis globus hystericus. She then disappeared until May 29, 1917, when she returned complaining of some pain in the throat and a feeling of fullness, and said she could not swallow right, as there seemed to be something in the way. Making pressure on the tongue with the tongue depressor caused her to complain of pain. There was no apparent inflammation of the throat, but there seemed to be a little elevation of the dorsum of the tongue of the left side, and palpation revealed a small mass the size of a hazelnut which was tender. Temperature and pulse were normal. I could not detect fluctuation. I transilluminated with the pharyngoscope under the tongue, and a definite shadow outlining mass could be seen. I introduced an aspirating needle and drew off about a dram of pus, from which cultures were made that showed staphylococcus. I incised the mass and the patient made prompt recovery. Broth cultures showed cloudiness and sediment in forty-eight hours; agar slants, a slight culture in thirty-six hours, abundant in forty-eight hours.

The sensation of foreign body in the throat which this patient complained of the past nine months has disappeared, and I believe this abscess was present and lying dormant at that time. It has been suggested that this might have been a broken down gumma, but I did not think so, because healing was prompt, and no specific treatment had been given for over a year. There was no necrotic tissue in the abscessed area.

XVII.

CASES ILLUSTRATING THE DIAGNOSIS OF INTRA-CRANIAL COMPLICATIONS OF EAR DISEASE COMPLICATIONS.

By G. W. BOOT, M. D.,

CHICAGO.

ACUTE MASTOIDITIS, OPERATION, RECOVERY—EXTRADURAL
ABSCESS, OPERATION, RECOVERY.

E. A. O., age forty-nine years, married, American, railroad conductor. No previous ear trouble. Left sided earache in the latter part of April. Applied for treatment two weeks later. M. T. S., red and bulging. Paracentesis. Paracentesis repeated several times in the next few weeks. A mastoid operation done about July 15th. Wound healed promptly with cessation of discharge.

October 7th patient quit work on account of severe left sided headache and dizziness. Vomiting next day. Conjunctiva of left eye congested. Pains in left side of head, radiating to occiput. Two or three days later he had transient diplopia. Some optic neuritis, but not true choked disc. The headache was so severe that it could only be controlled by morphin.

October 13th, three months after the first operation and two and one-half months after the operation wound had healed, the mastoid was reopened but no pus found. On extending the wound upwards and removing the tegmen tympani a small extradural collection of pus was found. Patient complained much of dizziness and headache for several weeks but recovered with practically normal vision.

This case was peculiar in the long time that intervened between the first mastoid operation and the occurrence of symptoms of extradural abscess. The diplopia reminds us of Gradenigo's syndrome except that it was transient. The characteristic symptom was the severe one sided headache. The dizziness is worth noting.

CHRONIC SUPPURATIVE OTITIS MEDIA, TEMPOROSPHENOIDAL
ABSCESS—OPERATION—RECOVERY.

April 6th. M. M., schoolboy, aged fourteen years. Has had considerable trouble with his ears, particularly the left one, which would ache, then run for a while and stop, only to repeat the same course a little later. Patient has been unusually irritable for a year. The last attack of ear trouble began five weeks ago as a left sided earache. Next day the ear began to discharge and has not stopped. Three weeks ago he had a profuse sweat. No chills. Temperature normal for the past week. He has not been quite right mentally for three weeks. Has had much headache and has been hypersensitive to sounds. He has complained much of dizziness, but has never fallen. For three weeks has had difficulty in naming objects—for instance, he wanted a baked apple to eat, and said, "I want, you know, one of those round things with juice over it." His memory for names has been growing worse. Today he is semicomatose but resists examination, saying, "Leave me alone." Right drum normal; left, congested with landmarks obscured. Considerable pus in left canal. Left mastoid tender. No spontaneous nystagmus. Pupils equal and responsive to light. Right optic disc reddened with a little edema. Left optic disc normal except for distension of veins. No paralysis of extrinsic eye muscles. No paralysis of the trifacial. Right side of mouth slightly paretic.

During the examination he had a typical attack of tetany. No rigidity of neck. Retention of urine. Urine normal.

Lumbar puncture gave a clear fluid, under increased pressure. No increase in cells. A few diplococci found in stained smears from spinal fluid. Smears from pus in external canal gave a capsulated diplococcus, not lanceolate and occasionally growing in groups of four, arranged in the form of a square.

Mastoid operation under ether. Mastoid diploetic. Pus in antrum. No fistulous opening leading into cranial cavity. Tegmen removed. No pulsation of dura. Cross incision of dura led to immediate loss of cerebrospinal fluid and protrusion of brain. Incision of brain two centimeters deep evacuated between two and three ounces of clear yellow pus,

mucoid in character. Drainage by means of a short rubber tube. Patient did well and recovered.

December 10th. Patient well physically, but rather intractable. Does not attend to his lessons well and memory is poor. The loss of the power to name objects is the important symptom. The other symptoms pointed to increased intracranial pressure, but not to the location of the lesion. He is now serving in the U. S. Navy.

CHRONIC SUPPURATIVE OTITIS MEDIA, SUBPERIOSTEAL ABSCESS
IN FRONT OF AURICLE, EXTRADURAL ABSCESS, TEMPORO-
SPHENOIDAL ABSCESS—OPERATION—DEATH AFTER
NINE DAYS.

M. W., age forty years; married; Irish laborer. Patient was admitted to hospital in an irrational condition. Has great difficulty in expressing himself. Apparently cannot recall words which he wishes to use. Can count fingers correctly, but on being shown a knife and asked to name it said "Second." Asked to name keys, he said "Second." For the name of every object shown him he gave the name as "Second." When asked to show how he used a knife he made the motions of whittling. He has a swelling the size of a small walnut in front of the left auricle. No tenderness over left mastoid. No history of tenderness over left mastoid. Left ear has discharged at intervals for sixteen years. Pupils react to light, but are sluggish.

Left mastoid operation failed to find pus in the mastoid except in the antrum. On separating the periosteum from the mastoid forwards in front of the left auricle, a subperiosteal abscess holding two or three drams of pus was found. An opening was found leading from this into the cranial cavity. This was followed up, and the extradural abscess evacuated. The tegmen tympani was removed and a cross incision into the dura above the tegmen made. No cerebrospinal fluid escaped. The temporosphenoidal lobe was incised, and about half an ounce of thick pus evacuated. Drainage by means of rubber tubing. Patient did well for several days, but died rather suddenly on the tenth day after admission. At the postmortem examination there was found an abscess cavity in the left temporosphenoidal lobe of a size

to contain about a half ounce of pus. It had a thick capsule, but had been opened and drained.

Cultures from the abscess cavity gave myriads of typical colonies of a long chain hemolytic streptococcus.

The loss of the power of naming objects was seen typically in this case.

CHRONIC SUPPURATIVE OTITIS MEDIA, CHOLESTEATOMA, MASTOIDITIS, LABYRINTHITIS, DEHISCENCE OF TEGMEN TYMPANI, ABSCESS OF TEMPOROSPHENOIDAL LOBE, MENINGEAL HEMORRHAGE, JAUNDICE.

A. L., single, Russian, tailor. Admitted December 23, 1915, in irrational condition. Says he has been sick three days, but is too tired and too mixed up about it to tell anything, anyway.

He cannot say the words he evidently wishes to say. When asked his age, he replied "thirty." When asked his occupation he replied "the same." |

He is very toxic and stuporous and is deeply jaundiced. He has occasional Jacksonian convulsions of right arm and leg, with an occasional twitch of the left side of the face. Eyes deviate to the right. He has a rapid horizontal nystagmus to the right. Pupils pin point in size. The right eye reacts a little to light. Patient cannot be made to look towards the left. He has herpetiform lesions on the lips and margin of the nose. There is a small amount of foul smelling discharge from the left ear. Left membrana tympani has a perforation in its upper part. Patient apparently does not hear the higher tuning forks with the left ear. There is a little spasticity of the extremities, most marked on the right side. The deep reflexes on the right side are increased. Ankle clonus is present on the right side. Tache cerebrale is present.

Spinal fluid shows a clear, pale, yellow fluid, under increased pressure, containing thirty-three cells per cubic millimeter. No Kernig, no rigidity of neck. Leucocytosis, 17,000.

Mastoid operation done the same evening. Cholesteatoma found. Dura over cerebrum and cerebellum exposed. Temporospheoidal lobe explored with a large needle in several directions. No pus found.

The mastoid operation was then converted into a labyrinth operation. Patient died the next evening. At the postmortem examination an abscess was found in the left temporosphenoidal lobe that had been punctured three times by the exploring needle. It contained thick pus and was surrounded by a considerable area of softening. There was a large subdural hemorrhage over the whole left hemisphere and also hemorrhage into the ventricles and between medulla and cerebellum. The loss of memory of words was marked in this patient. The postmortem shows the error of using a needle for exploring the brain. The location of the abscess had been correctly diagnosed, and it had been entered by the exploring needle but the pus was not found.

ACUTE SUPPURATIVE OTITIS MEDIA, MASTOIDITIS, SINUS THROMBOSIS, ABSCESS OF TEMPOROSPHEOIDAL LOBE, MENINGITIS.

January 1. E. D., female, married, age forty-two years. Patient had a running ear three weeks ago. The discharge stopped after three weeks, but the fever persisted. There was tenderness over right mastoid. She has had pain in the right elbow, shoulder and wrist. This condition resembles acute inflammatory rheumatism. There is an oval perforation one millimeter in diameter in the anterior inferior quadrant of the right membrana tympani with a small amount of discharge.

January 30th. Patient is running considerable fever. No tenderness of right wrist. Considerable tenderness of right mastoid. Hears whisper with the right ear at two feet. With the left at four yards.

Caloric test: Both ears respond, the right a little more slowly than the left. Patient improved until March 5th, when her temperature rose to 105. Pulse 130. Complains of headache and general malaise. No Babinski or Kernig. Leucocytosis of 10,750. Spinal fluid turbid with 1,300 cells per cubic millimeter.

Mastoid operation March 6th. Granulations found in mastoid. Sigmoid sinus found thrombosed. Pus found in temporosphenoidal lobe.

March 8th, patient stuporous; March 9th, general convulsions; March 11th, exitus.

The temporosphenoidal abscess in this case being on the right side, did not give loss of memory for names.

CHRONIC SUPPURATIVE OTITIS MEDIA, AURAL POLYP, CHOLESTEATOMA, FACIAL PARALYSIS, FISTULA OF EXTERNAL SEMI-CIRCULAR CANAL, MENINGITIS.

K. K., Bohemian, coat presser, age twenty-eight years. Admitted March 7th, with the diagnosis of meningitis.

Patient complains of headache and discharge from the left ear. He is tender over the left mastoid and is not able to close his left eye or use the muscles on the left side of his face.

His troubles began two months ago as a sore throat, followed by left sided earache. Two or three days later the left ear began to discharge. Headache became general and has continued. After four weeks of headache it became worse, and four days ago he noticed that he could not close his left eye and his neck became rigid.

Pupils react to light and accommodation. There is spontaneous nystagmus on looking towards the right, but none on looking towards the left. No Kernig, no Babinski.

March 4th. Spinal fluid cloudy, containing 400 cells per cubic millimeter. No bacteria in fluid. Noguchi +. Nonne +.

March 5th. Head retracted, neck very rigid; 11,000 leucocytes.

March 6th. General condition a little better. Thirty cubic centimeters antimeningitis serum given. Does not appear to hear any of the tuning forks with the left ear. Weber lateralized to the right. Spontaneous nystagmus to the right. Patient lies on his right side.

Irrigation of left ear with hot water causes horizontal and rotary nystagmus to the left. Left eye shows distinct papillitis, some of the vessels being covered with exudate as they pass over the edge of the disc. Right eye not examined.

Mastoid Operation.—A large cavity filled with cholesteatoma found. Polyp in external canal. After removal of the cholesteatoma the bone was found eroded over the horizontal canal and the eroded area covered with granulations. Pressure on the eroded area caused nystagmus to the left. The facial nerve was found not covered by bone. Sigmoid sinus exposed and found normal.

March 20th. Patient is doing well and feeling well. The facial paralysis is improving.

In this case the function of the left vestibular system was interfered with but not abolished, as shown by the nystagmus to the right that was reversed when the left ear was irrigated with hot water.

CHRONIC SUPPURATIVE OTITIS MEDIA, CEREBELLAR ABSCESS,
MENINGITIS.

W. S., married, German, laborer. Has had a discharge from the right ear for a year. A week ago had severe pain in the head. Four days ago began to vomit. Admitted to hospital in unconscious state. Neck somewhat rigid. Knee jerks increased. Right pupil larger than left. Both pupils responsive to light. Mastoid operation at 5:30 p. m., when patient had been unconscious six hours. Mastoid eburnated but necrotic over sinus. Pus around sinus. Cerebellum explored but no pus found. Sinus free from thrombus. Patient was perfectly normal the morning after the operation. Vomiting had ceased. Temperature, which was 105 before operation, fell to 98.6. He complained much of frontal headache. Tongue heavily coated. Three days after the operation he developed a crop of herpetic vesicles on the upper lip and right side of the mouth. On this day he complained of severe pain in the back. His constant cry was, "Mein Kreuz tut mir so weh." Nine days after the operation he had nose bleed. Ten days after operation he vomited and complained of headache and was very restless. Thirteen days after operation he was unsteady when he attempted to rise and his neck again became stiff. Two days later he became unconscious and death followed during the night.

At postmortem there was found: Small abscess in right lobe of cerebellum. Soft clot in sigmoid sinus. Purulent meningitis in the posterior fossa of the skull and extending down around the cord. The cerebrum was free from involvement. The cerebellar abscess lay over the saccus endolymphaticus and the track of the exploring needle could be traced almost to the abscess.

The severe headache, the unsteadiness and the pain in the back are the marked symptoms in this case. The herpetic

vesicles three days after the operation probably indicated involvement of the Gasserian ganglion.

SYPHILITIC MENINGITIS, TOTAL LABYRINTHINE DEAFNESS IN ONE EAR, NEARLY TOTAL LABYRINTHINE DEAFNESS IN THE OTHER EAR—TOTAL RECOVERY OF HEARING.

C. F., single, Belgian, laborer, age eighteen years. Patient admitted with the examining room diagnosis of epilepsy. He is apparently totally deaf to the spoken voice. Pupils slightly irregular, reacting equally and promptly to light and accommodation. No nystagmus. Right internal strabismus. Deep reflexes increased.

Five days after admission patient had a convulsion and tried to bite the rod at the head of his bed. Has severe pain. Head tender on palpation and gentle percussion. No Kernig or Babinski.

On the sixth day after admission the ears were examined and the findings noted as follows:

Right ear totally deaf for all the tuning forks and the Edelmann whistle.

Left ear hears the forks from $C = 128$ to C_4 . None of the forks above or below these limits was heard. Bone conduction much shortened, none of the forks being heard by bone conduction.

Right drum membrane much scarred.

Left drum membrane slightly retracted.

Nystagmus on looking towards the left. Irrigation of left ear with cold water gives nystagmus to the right.

Wassermann on cerebrospinal fluid gives a + + + reaction.

The seventh day after admission he was given gram .45 of neosalvarsan intravenously. Up to this time patient had tried to commit suicide four times because of the intense headache. Patient was troubled for several days longer with dizziness, head noises, nausea and vomiting. He had two more doses of salvarsan, and following the last dose was given 90 grains of potassium iodid daily and one-sixth grain of bichlorid of mercury by deep hypodermic injection on alternate days. Under this treatment he recovered his hearing completely in both ears so that he heard from $C = 32$ to 25,000 d. v. of the Edelmann whistle. Vision was slightly

below normal, so that he could not follow his former occupation of soldering fine wires.

The severe headache pointed to meningitis, but the absence of middle ear suppuration did not indicate a suppurative process. The Wassermann decided the diagnosis. The recovery from almost complete bilateral labyrinthine deafness to normal hearing in both ears was remarkable.

FRACTURE OF SKULL, BILATERAL LABYRINTHINE DEAFNESS.

F. S., married, Polish, laborer, age forty-six years. Patient was struck by a street car and has been deaf ever since. Both drum membranes show congestion along manubrium, but nothing else. Patient does not hear any of the tuning forks by air conduction with the right ear. He appears to hear $c = 256$ and $C = 128$ by air conduction with the left ear. He also hears these forks by bone conduction but much shortened.

There is no response to caloric or rotation tests.

The X-ray examination shows a linear fracture running through the right temporal and parietal bones.

Two weeks later he was found to be blind in the left eye. There is primary optic atrophy of the left nerve.

He was discharged on the twenty-third day, hearing from 128 to 4096 d. v. by air conduction with the left ear.

CHRONIC SUPPURATIVE OTITIS MEDIA, CHOLESTEATOMA, MASTOIDITIS, SINUS THROMBOSIS, SLOUGH OF SINUS WALL,
EMBOLIC PNEUMONIA, HERNIA CEREBELLI, FACIAL
PARALYSIS—RECOVERY.

June 13th. Patient is a young married German laborer. Has had discharge from right ear since childhood. A month ago had right sided earache. No discharge until three days ago. Headache severe.

There is a small amount of whitish discharge in canal. Soon after admission he had a severe chill and temperature of 105.2. Leucocytosis of 14,500. Knee jerks increased.

Patient is very sick and apparently has a beginning meningitis. Simple mastoid operation. As soon as the outer layer of the mastoid was removed a cavity was entered containing a thin brownish fluid under pressure. When the débris in the cavity was cleaned out it was found that the outer wall of the

sinus had sloughed off. Free bleeding was obtained from the upper end of the sinus. The jugular was ligated and cut off and the inner wall of the sinus slit open for about one centimeter in the search for pus. Patient was doing poorly, so the operation was interrupted and he was put to bed. He improved until July 4th, when he complained of pain in the chest and coughed a good deal.

July 12th. His condition having improved enough to warrant it, he was again anesthetized and the mastoid operation converted into a radical. A cholesteatomatous mass was found occupying the upper part of the mastoid, while a reddish fungous mass occupied the cavity cleaned out at the first operation. This was evidently a hernia of the cerebellum, so it was not disturbed. The wound behind the auricle was closed by skin clips.

July 17th. The dressings were found saturated with cerebrospinal fluid. They continued to be saturated for several weeks.

July 25th. A hernia cerebelli has appeared in the mastoid wound where two of the clips have given way.

July 27th. A right sided facial paralysis has appeared. The hernia cerebelli was clipped off and a small compress applied.

August 7th. The facial paralysis has been recovered from. The wound is closed. The hernia is retained within the mastoid cavity, but can be seen in the canal. The discharge of cerebrospinal fluid has ceased.

BILATERAL MASTOIDITIS, THROMBOSIS OF THE SUPERIOR
LONGITUDINAL SINUS—JAUNDICE.

H. L., married, German, baker, age thirty-eight years. Admitted May 10th. Patient is deaf, and not entirely rational. He does not understand what is said to him and does not respond to questions intelligently. His wife states that he has been sick for six months, first with articular rheumatism and later with hemorrhages from the nose and mouth. Two weeks ago he became jaundiced rather suddenly and was weak, irrational and restless. At the same time his ears both began to run. He frequently vomited after eating.

There is now profuse discharge from both ears, and both mastoids are tender. He does not respond to hearing tests.

Pupils equal, regular and respond to light. X-ray examination shows both mastoids cloudy. Smears from cerebrospinal fluid give Gram positive diplococci. Cultures from spinal fluid give a pure culture of a Gram positive streptococcus.

May 13th. Double mastoid operation done today.

May 18th. His condition not having improved, the brain was explored, with no results.

May 20th. His temperature, which had ranged from 99.2 to 101.8, jumped to 106. He became hypersensitive, jumping at the slightest touch, and died on the 21st.

Postmortem showed thrombosis of the superior longitudinal sinus. The general interference with the mental processes, the nose bleed and the jaundice are important symptoms. The mental incompetency is explainable by the disturbed nutrition of the cortex. The nose bleed seems to have been the result of venous stasis in the upper part of the nose from closure of the superior longitudinal sinus. The jaundice was probably the result of bacteremia.

ACUTE SUPPURATIVE OTITIS MEDIA, LABYRINTHITIS, ANOMALOUS POINTING REACTIONS, FACIAL PARALYSIS—RECOVERY.

B. S., married, Jewish, baker, age thirty-eight years. Admitted November 5th, with the history that November 1st he had left sided earache. Next day his ear began to discharge and he was intensely dizzy and vomited.

On admission he was found to have total labyrinthine deafness in the left ear. There was spontaneous nystagmus to the right. No nystagmus to the left. Past-pointing to the left with the right hand. No past-pointing with the left hand. Purulent discharge from the left ear.

Does not hear any of the tuning forks with the left ear. Weber to the right. Rinné, left, negative (heard in right ear).

November 23. Spinal fluid gives a slightly positive Nonne: twenty-three cells per cubic millimeter. Temperature did not run above 90. His condition improving he was discharged, but returned on November 27th with a paresis of the left facial. This gradually improved and is now well.

In this case the unusual pointing reactions might be explained in two ways: Either he had a cerebellar lesion that

suspended the action of the centers for outward deviation of the left hand or he had a hyperirritability of the center for inward deviation of the left hand. The latter seems more likely, for he has recovered, which would hardly occur with a destructive lesion of the left cerebellum. However, a cerebellar abscess is not positively excluded as yet, though a cerebellar abscess that would cause dizziness, nystagmus and past-pointing would be apt to cause progressively increasing symptoms.

These are brief accounts of some of the complications I have had in ear conditions. From these and from other cases not reported I would conclude that the diagnosis of these complications is not easy, but requires careful examination of the history, the symptoms, the functional tests and the laboratory findings.

In extradural abscess the most characteristic symptom is the severe one sided headache, in a patient who has or who has had a running ear.

In abscess of the left temporosphenoidal lobe the most characteristic symptom is loss of memory for names, with weakness of the facial muscles on the right side. If the abscess is in the right temporosphenoidal lobe, memory for names is not lost unless the patient is left handed, in which case it might be lost. Right sided facial paresis may be present.

If the patient has a labyrinthitis, complete labyrinthine deafness, anomalous pointing reactions, headache and choked disc, look out for cerebellar abscess, and when exploring for it, remember that the abscess is apt to lie either near the internal meatus or over the saccus endolymphaticus.

If the patient has rigid neck, positive Kernig and a cloudy cerebrospinal fluid with increased polynuclear count, the diagnosis of purulent meningitis is settled.

In the cases of thrombosis of the superior longitudinal sinus there is a lack of mental ability, an inability to comprehend what is said and to reply, that is quite characteristic when once seen, but which is difficult to describe. Nose bleed is a symptom to which I am inclined to attach considerable importance in the diagnosis of thrombosis of the superior longitudinal sinus.

Syphilis of the vessels, syphilitic meningitis and gumma usually lack the preceding middle ear suppuration. The symptoms are not apt to be confined to one side of the head, and the Wassermann on the blood and cerebrospinal fluid gives an indication of the cause of the symptoms.

In conclusion, I would say that when in doubt it is probably better to explore the brain than to omit such exploration. The exploration is best done by means of a double bladed explorer similar to the one designed by Dr. Gifford of Omaha.

122 S. Michigan Ave.

XVIII.

THE IMPORTANCE OF RECOGNIZING THE RELATION OF EAR CONDITIONS TO THE GENERAL SYSTEM.*

BY GEORGE E. DAVIS, M. D.,

NEW YORK.

In a paper read before the American Laryngological, Rhinological and Otological Society, May, 1916, I emphasized the significance of recent functional tests in furnishing valuable information in the diagnosis, not only of certain ear conditions and their etiology, but affording direct evidence of the intimate physiologic and pathologic relation of the ear to the whole organism, but particularly to the central nervous system. A comprehensive knowledge of these several functional ear tests, therefore may prove of large importance to conscientious workers in all fields—medical, surgical and neurologic, as well as the specialties of otology and ophthalmology, etc.

In view of the complex structure and multiple functions of the eighth nerve, and its intimate connections through the nervous system, not alone with near but remote regions, it is not surprising that pathologic involvement of this particular nerve not infrequently is manifested by manifold and diverse symptoms, both direct and reflex, and covering a large field.

To properly interpret all these varied symptoms is no small or easy task, and I fear most of us, at times, must plead guilty as slackers, but, unless one is given to systematic and thorough examination of every symptom and tracing the source, accurate diagnosis is impossible and treatment unsatisfactory.

In the report of the cases I make this evening it is not my purpose to go into the details of functional ear tests, with which you are quite familiar, but simply to illustrate the valuable information gained by their practical application in our

*Read before the Section of Otology, New York Academy of Medicine, February 8, 1918.

daily work and their great aid in facilitating accurate diagnosis and correct treatment.

Case 1.—Margaret D., age eighteen years, consulted me September 10, 1917, with the following history:

Nine years ago had adenoids and tonsils removed. Since the operation she has noticed increasing impairment of hearing varying in degree at different times. Some tinnitus both ears. Four years ago she had measles, but suffered no complicating infection with the ears. Three months ago had an operation on the nose. Patient is thin and anemic. Hutchinson teeth, badly decayed. Family history negative as regards deafness and syphilis.

FUNCTIONAL TESTS.

Right		Left
Neutral	Weber	Neutral
Shortened	Schwabach	Shortened
Plus	Rinné	Plus
Shortened	C	Shortened
Moderately shortened	c ¹	Moderately shortened
Moderately shortened	c ⁴	Moderately shortened
5.1	Galton	5.1
24 (2v)	Low Note	24 (2v)

STATIC.

10 turns to right—after-nystagmus 20" to left.

10 turns to left—after-nystagmus 15" to right.

Blood Test.—Wassermann negative or feebly positive.

This patient had been treated for eighteen months for chronic middle ear catarrh, without any improvement whatever, but was gradually growing worse.

In view of the lowered air conduction for the middle register, together with the rather marked shortened bone conduction, my interpretation of her case was specific nerve deafness due to hereditary syphilis. Notwithstanding the negative or feebly positive Wassermann antisypilitic treatment effected decided improvement in her hearing—corroborating the diagnosis. The improvement in air conduction was more marked than the bone conduction.

Case 2.—Marie G., age seventeen years, consulted me January 23, 1918, and gave the following history:

Cerebrospinal meningitis when three years of age. Severe attack. Scarlet fever a little over four years ago, followed in

a short time with measles. No ear complications at the time. Confined to her bed three months, three years ago, with rheumatism which involved the heart and left her with mitral valvular murmur. Noticeable impairment of hearing for past year—probably coming on gradually for some time before. Tinnitus both sides, worse on the right. Both drums slightly retracted and dull. Eustachian tubes slightly constricted. Hutchinson teeth. Enamel worn from the front of the upper incisors as observed following scarlet fever at times. Knee reflexes almost absent. Mentality of a child of eight years.

Family History.—Maternal grandfather was hard of hearing. Mother gave birth to eight months' premature dead fetus. Patient was born three years following the premature birth. One brother, three years younger, is healthy. Father very thin and never very strong.

FUNCTIONAL TESTS.

Right	Weber	Left
Short	Schwabach	Short
Negative	Rinné	Plus
Shortened	C	Shortened
Shortened	c ⁴	Shortened
Shortened	a ¹	Shortened
Short 12"	Bone conduction	Short 14"

Gait unstable and with spreading feet when eyes are closed. Romberg positive.

Static Tests.—No response to turning or caloric tests. Patient said she felt a little dizzy only during the tests.

Wassermann 2 plus.

Notwithstanding the numerous infections suffered by the patient, I feel that the luetic condition is principally responsible for the nerve deafness.

Case 3.—Mrs. Mary M. for four weeks has suffered from severe vertigo. Two weeks following beginning of vertigo she suffered with blowing tinnitus which lasted a week. The vertigo of which she complains is only of momentary durations, brought about by stooping or raising up suddenly. The tinnitus was constant.

Examination shows: (1) Enlargement of thyroid gland, which patient says is of two years' duration. Blood pressure 135 systolic, 86 diastolic. Knee reflexes normal.

(2) FUNCTIONAL TESTS.

Right	Weber	Left
Lengthened	Schwabach	Lengthened
Negative	Rinné	Plus
Negative	C	Slightly shortened
Shortened	c ⁴	Very slightly shortened
Shortened	a ¹	Very slightly shortened
150 (2v)	Low Note	24 (2v)

STATIC TESTS.

10 turns to left—after-nystagmus 15" to right.

10 turns to right—after-nystagmus 20" to left.

Inspection of drum on right shows large kidney-shaped perforation, curving under handle of malleus, as a result of a suppuration in childhood. The vertigo, I believe, is due to the thyroid condition.

NIX.

THE VALUE OF THE RESULTS IN ANACOUSIA DEPENDS ON THE LOCAL AND GENERAL CON- DITION OF THE PERSON WHO IS DEAF.*

By G. DE PARREL, M. D.,

It would be unwise to make a prognosis on the possible degree of improvement of deafness and concomitant troubles from treatment by anacusia: too many factors influence the value of the results. The task of the physician having the case in charge consists in placing in action all the forces at his disposal to obtain the best result. With these in view, he will seek out the best method to pursue in order to obtain a clear idea of the functional symptoms, of the general health, and of the conditions of life of the patient. This secured, he will proceed with circumspection and with the most approved technical experience, and will make use, according to indications, of all contributing aids which are at his disposal.

Having ourselves pursued this plan in our extended experience with anacusia, we desire here to draw from it some useful lessons for the employment of the infinitely varied resources which the electrophonoid method offers, according to the nature of the affection; as to the judicious employment of the numerous assisting agencies which are at our disposal in a particular case. Furthermore, we discuss the necessity of supporting the local use of sonorous massage by proper general massage. We will then, in order to divide this investigation clearly, study the value of the results according to:

1. The nature of the aural trouble present;
2. The general health of the patient and the condition of life, age, profession, occupation;

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3. The technical employment and the additional aid at our disposal. This latter point will be the subject of our second communication to this congress.

I. The value of the results depends upon the nature of the aural trouble present. Aural nosology has not yet been definitely fixed and, for the moment, it is a question whether possibly the limits established between certain morbid entities are not too elastic or artificial. However this may be, we think that we can give greater clearness to this exposition of the value of the results obtained by anacusia treatment by passing in review the principal functional symptoms rather than the affections, certain of which do not have the name which they deserve, the clinical and anatopathologic table which characterizes them not having been yet perfectly established.

Without fear of insisting once too often, we again emphasize the capital importance which is to be ascribed to the presence or absence of paracusis Willisii. The longer our experience in auditory reeducation, the more we would affirm that every deaf person who hears better in the presence of noise can be benefited by acoustic exercises, and we have already said that a labyrinth excitable to incoherent noises of every nature is by nature still more excitable to a complex sound of infinite variety in pitch and timber capable of modification and regulation at the will of the experimenter. Up to the present time we have never fallen in error upon this point in our practice, and this is why we do not fail to place in evidence and repeat that the presence of paracusis Willisii demands imperatively the trial of anacusia treatment.

Inversely, the determination of a complete ankylosis of the stapediostapedial articulation with a markedly accentuated hypoacusis, impermeability of the tube, shortened Schwabach, positive Rin   with symptoms of vertigo, should make us place a most guarded prognosis upon possible improvement of the hearing, without, however, absolutely contraindicating the trial of electrophonoidal massage, the more so as this does not cause any inconvenience either from the local or general viewpoint.

One of the groups of symptoms most favorable for anacusis is the following: Slowly progressing deafness, not yet pronounced negative Rin  , lengthened Schwabach, positive

Gellé, open tubes, intermittent tinnitus of a low character, not intense, drum membrane only slightly altered in appearance and movable, little or no vertigo, paracusis Willisii, persistent headaches.

Also encouraging, from the point of view as regards anacusis, is deafness in young people with persistent noise (whistling, singing of birds), drum retracted and opaque in appearance, somewhat movable, negative Rinné, some vertigo, restricted movement in the stapediostibular articulation. Attacked at their onset, these functional disorders can be completely relieved as a result, without doubt of the recovery power of the auditory organ and of the suppleness of the circulation in young persons.

There is a class of symptoms entirely different when we find ourselves in the presence of a semideaf person whose hearing by the aerial route is better than that by bone conduction, who has a Schwabach a little shortened, a positive Gelle, a Weber lateralized to the healthy side, attacks of vertigo of a moderate degree, whose drum membrane shows slight evidence of sclerosis, and in whom finally the upper limit of hearing is lowered. The patient has, in a word, symptoms of a recent chronic labyrinthitis without participation of the windows or of the ossicular chain. We can have recourse to acoustic exercises in such cases with much promise of success, the only condition being that a somewhat different technic be employed, which we shall describe in our second article.

The improvement obtained is not less interesting, although less marked, in the presence of the characteristic signs of impaired movement of the ossicular chain, especially of the stapes, retraction of the membrane, hypertrophy of the mucous membrane or the existence of adhesions, reduced permeability of the tube with negative Rinné, prolonged Schwabach, Weber lateralized to the involved ear, continual and usually peculiar sounds in the ear, such as the noise of sea shells, escaping gas, etc., the sensation of congestion of the head.

Still another table of symptoms demands our attention: A normal drum, a permeable tube, positive Gellé positive Rinné, lowering of the upper limit of hearing, frequent congestion

of the head, especially after eating, labyrinthine troubles, particularly vertigo, hyperarterial tension, exaggeration of the second sound at the aorta, asthmatic dyspnea, etc. Anacousis, in connection with appropriate treatment, serves to combat efficiently in the early stage these circulatory phenomena in their local and radical manifestations, diminishing the vertigo and the noise, stopping the evolution of the process of denutrition and improving at the same time the hearing, finally restoring to normal the arterial tension.

We have already referred to the remarkable drying effect of electrophonoid massage in chronic otorrhea, even in cases of long duration: after fifteen or twenty treatments we often see the discharge decrease, become serous, then at the end of a short time entirely cease without any tendency to recur. Anacousia treatment, as seen by those who employ it, acts upon groups of symptoms altogether removed one from the other, and, as it were, opposed to one another. This therapeutic reaction of anacousia so eclectic in nature has furnished an objection to the critics of this new procedure, who refuse to admit that affections, so different in the functional and anatomic troubles which characterize them, can be equally influenced by one and the same treatment, and nevertheless nothing is more easy than to explain the results obtained by anacousis in soil so varied. It suffices for this only to understand the physicophysiologic mechanism. It perhaps will not be superfluous to describe this here anew, at least in a general way.

The action of graduated sonorous sound is threefold:

1. The stimulation of the auditory organ by the physiologic excitant.

2. Pronounced modifications of the aural circulation.

3. Mobilization of the tympanum and chain of ossicles.

(a) It is not necessary to dwell upon the physiologic principle which defines the remarkable influence, so far as its function is concerned, of normal stimulation on each of the sense organs. The human ear is no exception to this law; the only difficulty consists in being able to furnish it a sound of a physical character entirely similar to that of the human voice, the normal physiologic excitant and of succeeding in regulat-

ing its action by modifying at will its intensity, its height and its timbré. The electrophonoidal apparatus has been constructed by Zund-Burguet with this object in mind, and there is no question but that he has succeeded in his attempt. If we analyze the sounds produced by this apparatus we are able to recognize in it a complete physical identity with those of the human voice. As a result, the problem propounded by Urbantschitsch has been solved.

Auditory reeducation has for its first object the awakening of a function dormant from nonuse or hindered by the degeneration of the tissues and that, naturally, within the limit of the anatomopathologic disorders produced by the evolution of the disease which is the cause.

Just as by exercise we can, in the normal state, develop to a considerable degree, the sight, the touch, the smell, the taste, the hearing, in the same way, by graduated physiologic stimulation can we, in the pathologic state, obtain an improvement of the auditory function or of that part of the auditory function which still remains. One case differs from the other only in the difference of the point of departure and of the difficulty in progression.

(b) As far as that which concerns the action of anacusia upon the auricular circulation, this is proved by the hyperemia of the drum membrane seen by the otoscope after sonorous massage, the sensation of warmth which the patient experiences at the base of the auditory canal and in the external ear, the reappearance of cerumen, and the drying up of otorrhea.

Sonorous sound causes a stimulation of the vasomotor nerves which is shown functionally by a powerful response of the vascular system, an energetic vasodilatation, and by even a pronounced irrigation of the entire auditory tract and the regions adjacent. What are the results of this renewed vascularization? At once a hypernutrition of the mucous membrane of the ear, and as a result a stopping of the process of atrophic degeneration when it exists. If there is a chronic suppuration, these modifications in the circulation bring about a suppression of the blood stasis, and favor the infiltration of round cells through the surface of the epithelium. There are diapedesis and phagocytosis. There is produced on the

other hand an active proliferation and a rapid epidermatization at the base of the old ulcerations scattered over the mucous membrane of the tympanum.

By its remarkable vasomotor effects, electrophonoidal anacusis is antagonistic to the evolution of the lesions of arteriosclerosis of the ear, to endoperiarteritis of the vessels, to spasm of the small arteries, later to the phenomena of necrobiosis through thrombosis and denutrition.

In the double rôle of stimulation of the organ of perception and by modification of the auricular circulation, treatment by anacusis is well indicated also in chronic labyrinthitis and in atrophic sclerosis, as in chronic otitis media catarrhalis or suppurativa.

(c) Let us consider now its action upon the mechanical troubles involving the middle ear, whether through chronic arthritis or from interference with vibration of the osteoarthromuscular system, due to the effect of cicatricial new growth, such as adhesions, bands, hyperplasia of the mucosa, thickening of the tympanic membrane, etc.

The classical procedure for mobilization of the auricular chain and of the stapes is either by the inflation of air in the tympanum through the eustachian tube, by continued traction of the hammer, or by massage of the drum membrane, direct or indirect; the objection to this last procedure is that it does not correspond to the vibratory demands of the middle ear. To mobilize the drum membrane with the Delstanche instrument is to make use of a measure very unlike the physiologic concussion which is furnished to the membrane and the chain by sonorous sound; it is to replace the rapid, gentle effect of sonorous vibration by the brutal, slow action of an artificial concussion produced by manual pressure. Modern use of these various therapeutic measures gives, we are told in our classical treatises, good results in dry chronic adhesive otitis media, but the mobilization of the auditory tract by sonorous sound is much superior because it is physiologic; placed at the head of this treatment of so rebellious an affection, it brings about a much more rapid and complete improvement of the functional troubles, especially that which concerns the improvement of motion of the chain and of the stapes. Anacusis acts like kinesitherapy upon the functional incapacity of a membrane

or an articulation. The machinery of accommodation is subjected to true passive movements which can be varied in amplitude and rapidity according to necessity, dependent upon the nature of the sounds employed. The practice of anacusia has taught us, for example, that in ankylosis of the stapes it is preferable to make use of acute sounds which commend themselves by the brevity of their tones.

The passage of vibrations through the tympanum gives rise to a stimulation of sensitivity and muscular contractibility, shown for the first time by Raoult, and one can easily understand that as a result there is a much greater elasticity of the ossicular joint and a progressive loosening of the adhesions which have formed between the chain of ossicles and the walls of the tympanum.

Another result of this liberation of the osteoarthromuscular system is labyrinthine decompression and the disappearance or, more often, the modification and attenuation of tinnitus aurium.

Vascular sounds (pulsation synchronous with the pulse, whistling, sound of spinning wheel) come in the domain of general therapeutics. As for labyrinthine vertigo, it can frequently be ameliorated if care is taken to regulate the sonorous stimulation in a manner to diminish the hypertension and the congestion of the internal ear.

Conclusion.—By its threefold circulatory mechanical and sensory action, electrophonoidal anacusia has a vast field of usefulness for combating effectively groups of symptoms essentially different one from the other, and this eclectic therapeutics is nothing but the direct consequence of the suppleness, regularity, variety, and power of mixed sonorous vibration, such as is employed in auditory reeducation.

II. The value of the results depends upon the general state of the deaf person and upon the condition of his life.

(a) The General State.—The general state of the deaf person enters to a large degree into the value of the results which we can obtain by anacusia. As Professor Roger has wisely said, living organisms are constructed in such a way that every modification, arising in one point of the system, shows its effect upon the entire system.

Many general maladies have an effect on the labyrinth. Reversely, no disease of the ear remains local; the reactions are more or less marked; although at times imperceptible, they do not the less exist.

It is by the reflex or circulatory route that general functional troubles show themselves upon the ear. As Boulaï of Rennes has remarked, the sensory nerve filaments, altered or not, transmit to the region of the ear nervous stimulations, vasoconstrictor or dilatory, spasmodic, hyperesthetic or asthenic in character, from a point of departure far remote, such as the intestines, the genitals or gastric tract. On the other hand, there is often a localization in the ear of an auto-intoxication through involvement of the circulation, renal insufficiency, toxic neuritis or by chronic constipation, visceral ptosis, enteritis, cephalic congestion, etc. It will be necessary, then, to take into account in the prognosis the results of these chronic factors of intoxication and to make the reservation in it which the general examination of the patient demands.

Progressive deafness frequently is found in an arthritic, gouty, neuropathic, syphilitic, rheumatic soil and, as a result, has to do with organs in a condition of diminished resistance; the less marked are the impressions of these predisposing causes the better are the results obtained in auditory reeducation.

The use of tobacco, quinin, alcohol, all chronic poisonings in general, influence unfavorably the value of the results; these ought to be treated with a course of active therapeutics.

So far as syphilis is concerned, it offers a perpetual menace of a complete apoplectiform deafness or at least of an intensification of the troubles of hearing in patients suffering from auricular sclerosis. When this is known to exist, we ought to always reserve a prognosis, immediate or remote, regarding hypoacusis, and warn the patient from possible loss, sudden or progressive, of the improvement obtained and of the uncertainty of the results.

The degree of improvement depends altogether upon the condition of the cardiovascular system. It is probable that the majority of ear affections have their point of departure in troubles of the circulation, local and general.

Blood stasis, lack of irrigation of the tissues of the ear, and endoperiarteritis of the vessels, are at the bottom of chronic infection of the auricular region, of atrophy of the labyrinth by hyponutrition, and of the degeneration, atrophic or interstitial, of the mucous membrane of the tympanum.

Circulatory disturbances favor the evolution of periostitis and the spongification of the capsule. The areas of osteitis, according to Otto Mayer, are of vascular origin and are the result of the nutrient vessels of the bony labyrinth, branches of the stylomastoid, governing the circulation of the cochlea and of the accessory canaliculi.

Electrophonoidal anacusia has, as is well known, an elective action upon the circulation of the ear which it affects. Its influence will always be profoundly favorable in all cases where the auditory tract is insufficiently vascularized—that is to say, in the majority of affections of the ear.

We would recall, in passing, that the vasomotor action of anacusis does not cease here, but that it seems to exercise an influence upon the general circulation. Helsmoortel of Antwerp, who has given especial attention to the question, states that regularization of the arterial tension and diminution of phenomena of hypertension and hypotension are the rule in the course of treatment.

(b) Conditions of Life.—The value of the results depends also upon the heredity of the deaf person, his age, profession, and his mode of living.

Hereditary deafness resists more than anything else treatment by anacusia, unless we can find a scientific reason for it, the more so as we do not know exactly the mechanism by which heredity acts upon the ear. So far as the age is concerned, it will suffice us to know that degree of improvement is inversely to the age of the deaf person, and to recall that in juvenile sclerosis it can be said that failure never takes place.

Profession plays a large rôle, not in the result which we can obtain, but in the maintenance of the result obtained. It is certain that we must not count upon lasting amelioration in a subject exposed, by his trade, to violent and continued noises, to chronic labyrinthine concussions (telephone operators, chauffeurs, artillerists), to differences in pressure of

great intensity (caisson workers, divers, aeronauts), to all inclemency of the air (hunters, fishermen, sailors, marines).

During the treatment we must insist in every case that the patient shall give up his work in order to avoid, at least for some days, these traumatisms to the ear, the result of occupation.

The maintenance of the result will rarely be obtained in deaf persons who are obliged to live on the sea shore. One can say without exaggeration that the sea is a personal enemy to the ear, especially in those who were not born there or who are not acclimated to the climate of the sea. We can attribute this unfavorable influence to the brusque changes of temperature, to the hygrometric condition of the highly charged air, to a chronic inflammation of all the mucous membranes of the rhinolaryngopharyngeal tract, the result of the cold, moist and irritant atmosphere.

II.—The value of the results obtained in anacusia depends upon the technic employed and the associated measures used.

Technic.—The technic of the electrophonoid method plays a capital rôle in the value of the results, and it is necessary to be acquainted with the modifications that must be made use of according to the case.

At the outset, in a general way it is preferable to give short treatments at frequent intervals, two or three times a day, of three minutes each are of more value than a single treatment of ten minutes. We must never forget that we are dealing with massage, gymnastics and sensory stimulation, and that, as in every other condition, frequent repetition of exercises has an action more intense and efficacious.

At the beginning of the treatment we must proceed with great circumspection, making use of a current of slight intensity. It should be the aim only to arrive at the very threshold of the dynamic phenomena—never to pass it. In other words, the labyrinth should not be irritated by an excessive sound. An exaggeration of the tinnitus and vertigo should be avoided.

In order to proceed with greater safety and prudence, it is desirable at the two or three first visits to treat only one ear at a time, in order to test the susceptibility of each.

It is not possible to determine this in a single day. It is a matter of tact, experience and especially of attention that one

acquires with time. The eyes and the mental reaction of the patient should always be noted and the expressions of his countenance. The least muscular contraction of his face is the first sign of danger.

We have seen persons treated at the outset with too great vigor who abandon their treatment because of the appearance of migraine or vertigo and of the increase of their head noises, and, what is still more serious, because for some days their hearing was made worse, an ensemble of symptoms which rapidly caused them to be discouraged. On the other hand, it is certain that, practiced with gentleness, electrophonoid anacusia will not produce symptoms of this kind. If it does not lead to a satisfactory result, it will at least in no case aggravate the condition.

But it is especially where chronic labyrinthitis exists, and in old people, that all precautions in technic are indispensable. If in spite of this we see a slight exaggeration of the troubles of equilibrium or of the subjective noises develop, it is imperative to stop all treatment at once.

In every case of labyrinthitis and whenever a patient complains of vertigo, high sounds are to be employed but with extreme gentleness. One ear only at a time is to be treated. On the contrary, when the middle ear only is involved, low and medium sounds ought to form the basis of anacusia re-education.

The patient has also his responsibility in the matter, and he ought to collaborate conscientiously with the physician. Great perseverance and punctuality are required, and only rare absence from his daily exercises must be permitted of him. This has an especial bearing in men closely occupied and who respond with difficulty to this discipline. The authority of the physician is necessary to insist upon the importance, early and late, which there is on the part of the patient following out his treatment to the letter, and regarding his two seances each day as his first two obligations.

On the other hand, the rest of Sunday ought to be respected, and if it does not exist we must create it. We have often noted that Monday morning the improvement in hearing was much more in evidence, just as the amelioration is still better eight or ten days after the cessation of the exercises.

Toward the fifteenth day of treatment the patient passes the critical moment. He is accustomed to his initial improvement and, far from being contented, he wishes to hear as well as anybody else. Moreover, he finds this double treatment actually fascinating. This is because the moral cure is playing its rôle, and the aurist on this account ought with much emphasis to dwell upon these points, to stimulate any failing desire on the part of his patient, to make him comprehend the absolute necessity of persevering in the treatment which he has commenced. Indeed this is by means the least rôle of treatment by anacusia because, for the most part, deaf persons are on the road to neurasthenia and bear poorly their forced isolation. They are at a high point in their dislike of life and are prone to sadness, the sister of enforced solitude.

Associated Measures.—Voice is of first importance in reeducation. By the electrophonoid method the labyrinth becomes stimulated, the ossicular chain is passively vibrated; the circulation is rendered active, but the patient submits to these physiologic reactions. We compel him to hear. This is only a step on the road to improved hearing. The object to be attained remains. Making the patient hear is the chief part of anacusia, which alone deserves the name of reeducation, which altogether is as important as the first. The result obtained will be twenty-five per cent better if we submit the patient to these auditory gymnastics. If because of failure of time or faulty laryngeal conditions the physician cannot do this part of the treatment, he ought to give it over to one or more assistants or to the family of the patient, or finally to the patient himself, for this purpose using the wide tubes of Dr. Emile Tillot of Rouen.

We will leave for another occasion the detailed explanation of the technic of this reeducation by the voice. It is sufficient for the moment to say that it consists in repeating to the patient a series of isophonic words, existing or not existing, pronounced in a high voice and in a whispered voice, at a distance where the patient has a certain difficulty in perceiving them. This is done for about a quarter of an hour twice a day. One trains him also for a sensitive ear (if we may employ a classical expression, scientifically correct) to make his auditory organs of accommodation functionate, awakening

from their torpor these faculties of attention which for a long time have been growing numb by the habit of not paying attention to the conversation and so dwelling in perpetual silence.

This vocal reeducation calls for a great effort on the part of the patient, especially for the first few days. It causes intense fatigue, to such a degree that he always seeks to find a reason to avoid it. Here again it is necessary to assert authority, and at the end of a few days the perception becomes much easier; the dimness of sound which exists at the beginning gives place to a much greater clearness of tone.

Electric vibratory massage is another associated method of treatment of which I make frequent use **where there are symptoms** of stiffness of the ossicular chain, the result of a chronic arthritis or in the presence of bands of adhesions in the tympanum with retracted drum. This bony vibration is especially efficacious when seen in a deaf person with beginning signs of labyrinthism, intermittent vertigo, isochronous with the pulse, sensation of fullness throughout entire head, tendency to congestion of the head, bone conduction equal or inferior to aerial conduction, etc.

There exists in each patient an "optimum" zone over the mastoid, where the application of the vibrating disc produces a concussion which is in every way pleasant, painless and at the same time awakens the contraction of the superficial muscles in that region, probably also the small muscles of the tympanum. Moreover, one can think of a congestion removing effect under the influence of this vibratory massage, and it is perhaps on this account that we frequently observe a marked cessation of the phenomena of labyrinthism.

I have made use also, with success, of the same procedure but applying it with a concave vibrating disc over the occiput.

These treatments ought not to last more than five or six minutes at the beginning, and it is preferable not to give them more than once a day. I commend for the auricular gymnastics the method of Fernet and diathermia.

It goes without saying that the physician making use of anacusia ought to procure for his patient all the improvement possible from the classical therapeutics in the course of the anacoustic exercises and ought not to omit in particular

inflation in hyperplastic adhesive otitis, interstitial sclerosis with thickening of the tympanum, stiffness of the chain, and especially in cases of tubal impermeability.

Otorhinopharyngeal hygiene ought to be rigidly insisted on. The auditory canal should be cleansed of all epidermal débris or cerumen which can be found there. The rhinopharynx ought to be perfectly clean and permeable. It is important for the patient to avoid all acute inflammations (coryza, angina, pharyngitis) during the period of his treatment, and with this in view to take every useful precaution.

I reach now, in conclusion, treatment of a general nature which ought to be the object of much solicitude on the part of the practitioner, because affections of the ear have a relation as cause or result with troubles existing in every other part of the organism. No one has failed to recognize that deafness is frequently found existing with gout, arteriosclerosis, rheumatism, arthritis. In our private practice we prescribe for the majority of our patients as rigid a vegetarian diet as possible and make use daily of purgatives with the idea of removing the toxins from the organism.

The function of the gastrointestinal canal, especially in women, should be carefully looked into, and chronic constipation ought to be actively combated. The lactic ferments, frequent purgatives, and massage of the abdomen form the best of these therapeutics.

In children suffering from juvenile sclerosis, we find often, as stated by P. Cornet of Chalons-sur-Marne, marked symptoms of autointoxication of the gastrointestinal canal, often causing congestion and sclerosis. It follows that calomel in small doses, repeated at considerable intervals, frequent purgatives, vegetarian diet, will aid greatly in the local treatment.

When we note symptoms of congestion of the ear, sensation of fullness, beating, intense noises and tendency to vertigo, headache with insomnia and neuropathic troubles we are in the habit of prescribing six pills of the following formula for six days, three series three times during the month: Extract of henbane, extract of valerian, oxid of zinc, aa 0.06; Indian hemp, 0.01.

In addition we order alcohol massage of the lower limbs, massage of the abdomen, strong purgatives, and especially we

complete locally this action by acupuncture of the mastoid or with leeches.

If we find a certain degree of hypertension, we place our patient on trinitrine, 2 dessert teaspoonfuls daily of the following solution: Alcoholic solution of trinitrin 1/100, L drops; distilled water, 300 cc., and later peptonated iodids, ten to twenty drops, before each meal, in a quarter of a glass of milk, regular gymnastics at home without tiring oneself; abdominal massage to reduce the congestion of the system, and rectal venous stasis to stimulate diuresis and to favor also a removal of the toxins from the system. We also favor a hypotensive action of the carbogaseous baths, such as they give at Royat, which reduce the pressure by producing an intense vasodilatation.

In order to obtain the greatest amount of improvement by auditory reeducation it is necessary to supplement this course of continuous treatment by an air or water cure—that is to say, by placing the patient under conditions of complete repose. To isolate him from his ordinary occupation and the fatigue of his profession is almost impossible of complete realization in the majority of cases. The ideal thing would be to establish sanatoria for the deaf out of the city, where the general health can be looked after at the same time as the local condition, and an efficient technic followed out—that is to say, give treatments, very short in duration, very gentle and more frequently repeated. This is a vision of the future. We must content ourselves for the present with making use of the physiotherapeutic action of electrophonoid anacusia in the best manner possible by adapting it with tact to each particular case and to supplement it by the additional means which are at our disposal. We must never forget that an intimate cooperation between a patient and physician is essential, that unflinching perseverance is bound to assist them, and that the value of the results depends not only on the direct or indirect action of the sonorous sound, but also on the will, the attention and the intelligence of the patient and the physician.

THE ROLE OF THE PSEUDODIPHTHERIA BACILLUS
IN THE PATHOGENESIS OF EAR, NOSE
AND THROAT DISEASES.

BY HARVARD MCNAUGHT, M. D.,

SAN FRANCISCO.

There are many questions of interest yet to be settled in regard to the pseudodiphtheria bacillus and that large group morphologically similar, known as diphtheroids.

The writer cannot present any additional facts to those already known, but wishes to report some clinical observations which are at least suggestive. A brief review of the known facts may be permitted. In 1887 Löffler discovered an organism in a pseudomembrane of the throat which he termed the pseudodiphtheria bacillus. The year following, Hoffman and Wellenhof did some work on it, and it is commonly known as the Hoffman bacillus.

It was not, however, until 1904 that much information of scientific value was recorded. In that year Graham-Smith made extensive investigation regarding the bacteriology, and Hamilton the pathology, of the large diphtheroid group.

With all the work done, however, there remain two important points to be yet determined, namely, the pathogenicity or otherwise of the organism; secondly, the question of whether it is a separate entity or an altered Klebs-Löffler bacillus.

Let us first glance at the main characteristics of the pseudodiphtheria bacillus, remembering that Hamilton investigated twenty-nine organisms, twenty-six of which were true diphtheroids.

Morphology.—It differs from true Klebs-Löffler in being shorter, stouter, straight, usually slightly clubbed. Usually stains intensely. It commonly shows but one unstained transverse band. When longer it may show two transverse bands,

and when short it may resemble cocci. It never has flagellæ or spores.

Staining.—It most often stains intensely and in a more uniform way than diphtheria bacillus. If colored by Roux's method or Neisser's, no metachromic end bodies can be defined.

Cultivation.—It grows more luxuriantly upon ordinary culture media than the diphtheria bacillus with larger colonies, less transparent and whiter when seen upon agar-agar. In bouillon, there is more marked clouding and less marked peltic formation. On Löffler's blood serum, it is too much like true diphtheria bacillus to be differentiated.

Chemistry.—The most essential points are, first, that the organism cannot be made to produce a soluble toxin, though the so-called virulent forms of Reudiger, Rosenow and others produce an antiserum specific for themselves; that they are able to ferment dextrose, saccharose and maltose while the true diphtheria bacillus ferments dextrose, dextrine and maltose but not saccharose. They are nearly all nonpathogenic for guinea pigs.

Distribution in the Body.—The diphtheroids are found on most surfaces of the body at some time or other, and have been recovered from normal tissues, such as lymph glands, cerebrospinal fluid, etc. This fact has been used as an argument by some of the nonpathogenicity of the organism, but that cannot be true any more than it can of the streptococcus or pneumococcus which is also commonly found. The pseudodiphtheria bacillus is frequently found without pathologic change in the nose, throat and external ear. Neumann found the organism in 100 per cent of normal noses, where it is called the bacterium coryzæ segmentosis. This organism is said to be of importance in common colds. Neufeld has encountered rods mildly pathogenic for guinea pigs in ozena. He considers them irritative but not a causative factor. Bergey states that the pseudodiphtheria bacillus forms are more important in continuing an inflammation than inciting it. Graham-Smith reports the organism as common in normal ears and in ears in scarlatina, and described two varieties which he considers normal in external ears.

Pathogenicity.—Very few reports of fatal guinea pig inoculation. The principal lesion is slightly indurated infiltration at site of inoculation. Hamilton reports a number of cases of otitis media chronica purulenta and otitis media purulenta acuta, due to this organism. One case had a streptococcus infection in the glands at the same time and showed two opsonic curves. These curves varied as vaccines were used; the pus formation and the pseudodiphtheria index were improved by vaccine of the pseudodiphtheria bacillus only.

Beyer reports a tracheitis and cases of pharyngitis due to these organisms. Cave, Hewlet, Priestly, Richmond, Knight and others believe that a mild, frequently unilateral tonsillitis may be caused by the virulent forms.

In some recent work done by Petri it was found that horses immunized with large quantities of filtrates of bacillus Hoffman would not produce any antitoxin to diphtheria toxin. This will explain possibly the failure of some supposed diphtheria cases to improve under antitoxin. The organism has produced a bacteremia and endocarditis.

Many well authenticated cases of disease in other parts of the body have been recorded, though in the majority of cases as in the cases to be quoted, there was lacking proper pathologic evidence. It is mainly to bring this to the attention of men in our specialty that I have submitted the foregoing review and the cases of my own which follow:

Case 1.—Alex. W., Finn, age forty years. Admitted to Stanford University Clinic November 1, 1912, suffering from otitis media purulenta acuta. Previous history negative. Present illness: Two weeks before admission had a sore throat on right side only; two days after, right ear began to ache. Next day it began to discharge but did not stop aching.

Status Praesens.—Mastoid swollen, red, tender on deep pressure over antrum and emissary. Membrana tympani: Left, normal, right bulging, red, small perforation below hammer, in which pulsating pus was seen. Weber to the right, Schwabach. Right, lengthened; left, normal. The nose showed slightly hypertrophied inferior turbinates and septum deviated to the right. Nasopharynx normal; tonsils medium, right markedly hyperemic. Temperature, 100°.

Treatment.—Paracentesis done, a free flow of pus ensued which was of a chalky whiteness, different from any other I had ever seen. The mastoid swelling and tenderness did not improve, and a simple mastoid operation was done. The destructive process was extensive. The patient made an uneventful recovery. Cultures of the pus from paracentesis and from the mastoid wound were reported as morphologically and in staining and cultural peculiarities to be undoubtedly pseudodiphtheria bacillus. Later cultures showed many pseudodiphtheria bacilli, but chiefly pus cells and a few pneumococci. In this case the unilateral tonsillitis, color of pus, morphology and cultural peculiarities would seem to place this case among those due to pseudodiphtheria bacillus.

Case 2.—Lucille S., female, age twelve years; seen in private practice. Complaint: Discharging right ear. Past history negative except for exanthemata. Tonsils and adenoids had been well removed some years ago. Had an earache when six years old, followed by discharge from ear, and this has continued intermittently to present time. Right membrana tympani gone, very few granulations in tympanum; small polyp from posteriosuperior wall of tympanum. There was a small amount of chalky white pus in the tympanic cavity. This was first reported diphtheria bacilli in pure culture. Second examination and plating with guinea pig inoculation led to the report of pseudodiphtheria bacillus. Two other laboratories reported pseudodiphtheria bacilli from morphology and cultural peculiarities. Treatment: No vaccines were used; washes and lactic acid were used without influencing the condition. I have lately given the patient autogenous vaccine, and there is some improvement in the discharge, though more time is required for observation.

Case 3.—Fred F., Italian, age twenty-six years, admitted to Stanford University Clinic, complaining of hoarseness of many years' duration. No cause was found in nose, nasopharynx or pharynx for this. Larynx: There was a thickening, almost prolapse, of the false cords. True cords normal in action, pink; arytenoids thickened and dusky red. There was always some thick mucopus around the cords at each examination. Bronchoscopic examination was negative; Wassermann, negative. In spite of this, the patient was put on

mixed treatment and became nearly salivated without influencing the condition. A section was taken from false cord and examined for Frisch bacilli and Mikulicz cells, but none was found, thus excluding rhinoscleroma. Cultures were made from the larynx on two different occasions and pseudodiphtheria bacilli reported.

Case 4.—Anna B., age nine years. Patient of Dr. Black of Palo Alto. Complained of hoarseness for some years. My examination showed a web between the cords at the anterior commissure. This case was subsequently operated by Dr. H. B. Graham, who reports that the web was simply removed under suspension laryngoscopy. Immediately following, a membrane developed at site of operation, and a culture was reported diphtheria bacilli. Subsequently this report was changed to pseudodiphtheria bacilli on the morphology and avirulence to guinea pigs. This and the preceding case seem to show the tendency to slow new tissue formation and infiltration mentioned by a number of investigators.

SUMMARY.

1. The pseudodiphtheria organisms occur normally on many surfaces and in many tissues of the body. It is probable that under normal conditions even the so-called virulent types are nonpathogenic, but may become so by symbiosis or a depressed general or local state.

2. The organism, so far as is known, is not a mutation form of the Klebs-Löffler bacillus, though at times resembling it in its morphology. Its behavior in culture towards sugars and the fact that it has its own opsonic index are additional proofs of its distinctiveness.

3. Negative results from guinea pig inoculations are not conclusive proof that it is a pseudodiphtheria bacillus, as avirulent Klebs-Löffler bacilli may give the same result.

4. In true infections with this organism agglutinin is formed and the serum opsonin is decreased. A mild bactericidal power of serum arises in patients, and a very pronounced bacteriolysin can be produced in experimental animals.

In conclusion, I cannot do better than quote the words of Fox, with whom I heartily concur, regarding this organism. He says: "It seems to the writer that in view of the well known difficulty in determining the exact relation of the

pseudodiphtheria forms to the diphtheria bacillus and the diseases it causes, it is only fair to demand that some of the immunity tests be presented. It is not to be expected that the organisms shall be isolated on every occasion and from every lesion in perfectly pure culture, but it can be required that the organism shall predominate and that the blood shall show some immunity reaction. By immunity tests and the sugar reactions I believe that we can separate the avirulent diphtheria bacillus, the pseudodiphtheria bacillus and the bacillus of Hoffman."

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XXI.

THE ASSOCIATION OF OCULAR AND NASAL ACCESSORY SINUS DISEASE.*

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It will be conceded readily that the careful study of the ocular symptomatology, either associated with or directly caused by disease of the sinuses accessory to the nose, constitutes the focal point to which converge two important specialties.

To the ophthalmologist the early recognition of this association is always an important matter, and his failure may be an exceedingly grave one.

It has long been recognized that the etiology of the often complex symptomatology of this anatomic and clinical borderland may require for its elucidation the cooperation of the internist, the laboratory and X-ray experts, in association with the rhinologist and ophthalmic surgeon.

Some of the ophthalmologists present will recall the discussion precipitated some ten years ago by Dr. Posey in a paper before the American Ophthalmological Society upon the position of the ophthalmologist in the treatment of nasal sinus disease, the plea being made for a more accurate appreciation and study of the relationship obtaining between these ocular and nasal structures.

In his discussion of Posey's paper, the late Dr. Gruening of distinguished, if somewhat bellicose memory, replied, "The ophthalmologists do pay attention to these conditions, and the ophthalmologist must be a rhinologist; that is understood, and there can be no doubt about it."

The enormous development of each of our specialties during the last ten years may well make us question this dictum of Teutonic finality.

*Read by invitation in a symposium before the Section of Otol-
ogy and Rhinology, College of Physicians, Philadelphia, Pa.

It was Arthur Christopher Benson who said of the specialist that he was harmless and necessary, so long as he was aware of his limitations.

The ophthalmologist who has the temerity to attempt an entrance into the field that you so preeminently command, if he has had sufficient training to make him conversant with these associated conditions, may intelligently examine and conservatively treat them, but must be prepared to ask the assistance, at the proper time, of his rhinologic confreres in the performance of the necessary operations upon the contiguous sinuses.

Let us try to disassociate our study from the stigma of undue magnification of the cause of the ocular symptomatology as necessarily resident in the sinuses, even though disease of both structures exists.

In the development of this thought it behooves us, likewise, to be constantly on guard to recognize the constitutional factors that may be inducing a toxemia of each of these contiguous structures at one and the same time, the proper treatment and removal of which may cause prompt amelioration and cure of the ocular and nasal conditions, without the need of other than the mildest local treatment.

The narrow viewpoint of the specialist was recently illustrated while discussing, with a distinguished professor of operative dentistry, the association of maxillary sinusitis with diseased teeth conditions, he stoutly maintaining that every such case was due to the teeth, and I think accepted, with considerable qualification, the writer's definite statement that about seventy-five per cent of such conditions were entirely disassociated with any dental disease.

Since the subject of accessory sinus disease, from the rhinologic standpoint, was so admirably reviewed in a recent symposium before the members of this section, participated in by such authorities as Skillern, Grayson, Van Sant, Coates, Gleason, Wood, Eves and others, it is my purpose to approach it in the main from the ocular viewpoint.

The rhinologist will unquestionably maintain that many cases of sinusitis are entirely minus any ocular signs, and indeed most of us will agree with so careful an observer as Jessup of London, when he suggests that, at times, there are

no characteristic visual changes associating these two contiguous structures.

Bryan of Washington believes that the majority of all the severe inflammations of the accessory sinuses are accompanied with more or less disturbance of the eyes, the variations being, as a rule, governed by the severity of the sinus disease, and that they are not discovered early because not adequately sought until ocular symptoms develop.

T. E. Brawley of Chicago (*Journal American Medical Association*, March 23, 1907, "The Relation of Diseases of Accessory Nasal Sinuses to Diseases of the Eye"), a painstaking observer and student of these associated conditions, maintained, as early as 1907, that every case of intraocular disease should be accompanied by a careful study of these contiguous cavities. Even a partial review of the literature will make most of us willing to assume the advanced position recorded by the late lamented Reber, that all manner of extra- and intraocular disease is, at times, traceable to nonsuppurative and suppurative pathologic processes in these contiguous nasal sinuses, and will certainly justify the observation that in all ocular diseases of obscure origin, the sinuses should be studied, and if ocular signs justify it, treatment of the suspected sinuses is indicated, even in spite of negative rhinologic report.

It is a fact that the careful special testing of visual function and the finding of certain changes in the visual field may establish a diagnosis before nasal symptoms have been sufficiently marked to attract attention, and further, it is not infrequent for closed empyemas and mucocoeles to give a false sense of security by an almost total absence of nasal symptoms, notwithstanding the presence of ocular change.

It is quite impossible, in a comparatively brief consideration of the subject, to refer adequately to a very extensive literature which has accumulated during the last ten years, much of which may be classed as intensive and epoch making.

Onodi, as is perfectly well known, has given special impetus to the whole subject we are considering by his contributions, which include a study of the oculoorbital, intracranial and cerebral complications as well as by his published anatomic

studies of the relations of the posterior sinuses to the normal and anomalous proximity to the optic nerve.

The anatomic studies of H. W. Loeb (*ANNALS OF OTOTOLOGY, RHINOLOGY AND LARYNGOLOGY*, June, 1909) likewise furnish illuminating data regarding the relation of the posterior sinuses to the nerve and chiasm, this distinguished writer having advised us that more than half of the nerve was included in the sinus portion.

The important relationship between the orbits and the sinuses, in the anterior segment of the skull, was the subject of an important communication by Dr. Samuel D. Risley, before the International Congress at Edinburgh in 1894, concerning abnormalities of ocular balance; it being even then recognized that departures from the normal contour in sinus development furnished a strong predisposing cause of interference with sinus drainage.

The strategic position occupied by these nasal sinuses with reference to orbital attack, by way of the roof, floor and inner wall, through the actual giving way of these thin, bony and mucoperiosteal partitions (and, indeed, in the case of the ethmoids, the existence of so-called dehiscences mark the absence of any but the latter protection), makes the direct extension by pressure, erosion and necrosis, or through the interstices, readily understood. Adhesions may occur between the orbital periosteum and the optic nerve sheath, and these adhesions may be vascularized, offering a direct route for ocular infection (Brawley).

It is quite unnecessary in this presence to trace the ophthalmic artery in its ramification from the orbit into the ethmoid and frontal cells, nor the return journey of the ethmoidal veins into their ophthalmic reservoir.

Again, the intimate association of the ciliary system need scarcely be urged as pointing to the ease with which a toxemia may reach the eyes. With the rôle played by the fifth cranial nerve in ophthalmic, sinus and intracranial disease you are also entirely conversant.

The rôle of the lymphatics and the lymphatic sheaths of the nerves should be given emphasis in tracing the likely routes of infection.

Regarding the latter method of transfer, it is claimed by Miodowski, as the result of his work in the clinic of Professor Brieger of Breslau (quoted by Freudenthal), that, by reason of their anatomic features, they should be and, he believes are, the best reservoirs of all invading bacteria.

It would be very desirable, if it were possible, to separate the ocular symptoms induced by sinus disease into two definite groupings, the anterior and posterior.

The anatomic association, already referred to, as well as the numerous clinical reports at our service, will serve to indicate the impossibility of any such dogmatic differentiation.

The routes of ocular involvement, secondary to rhinogenous disease, will be then—

1. By continuity.
2. By way of the blood vessels.
3. By way of the lymphatics.
4. By way of the lymphatic sheaths of the nerves.

Ocular symptoms, the result of abnormalities in the nasal mucosa, have long been an established fact, entirely apart from the presence of pus producing organisms. Differences in the power of accommodation in the two eyes have frequently been relieved, as recorded by such authorities as Ballenger, Stucky, Pyncheon and others, by the removal of nasal pressure in a partial excision of a hypertrophied middle turbinal. The disappearance of blepharospasm by the same procedure is a likewise generally recognized observation. Lacrimal disease from epiphora to blenorrhea may easily be associated with mechanical obstruction of the nasal end of the duct. Indeed the vicious rôle played by the duct, in the transfer of infection to the cornea, is a generally conceded possibility, S. Lewis Ziegler, for example, claiming that upwards of 90 per cent of corneal ulcers are due to nasal conditions.

Blepharospasm, dacryocystitis, photophobia, epiphora, ocular pain and reflex ocular disturbance, expressing itself in so-called asthenopia, have many times found a causative factor in nasal congestion, spurs, tumors, ulceration, hypertrophied or polypoid turbinal degeneration and from contraction from nasal synechia caused by the too vigorous use of the cautery. W. C. Parker, in a review of these associated conditions, believes 50 per cent of them are caused by nasal disease.

Ziem and Kuhnt have traced iritis and cyclitis to a nasal origin. Parker has found improvement in refractive defects to follow the lessening of ciliary irritation and congestion by nasal treatment, and few oculists today attempt to treat phlyctenular disease of the conjunctiva or cornea without taking into account the condition of the nose, the tonsils and the adenoids.

Stauffer of Salt Lake City has noted deep ciliary injection to be present in nearly all high deflections with pressure on the middle turbinal.

A number of writers, among them Griffin and Haskell, have recorded observations pointing to the vascular or reflex connection between nasal hypertrophies and glaucoma, the latter disease being greatly relieved by the removal of the thickened vascular structure.

Middle turbinal pressure may be either against the septum or antral wall, and a number of well known authorities insist that if pressure prevents free ventilation and drainage, the turbinal should be removed, even though it presents no pathologic changes, as the negative pressure thus induced within the ethmoid or frontal will eventually lead to pain, pus formation and ocular disturbance.

If the conditions briefly outlined are productive of evident ocular symptoms, it is surely not a far cry to the more profound lesions that may easily accompany the deeper sinus congestions, mucocoeles or empyemas.

The sinus involvement may run the gamut from a simple hyperemia to catarrhal inflammation, suppuration and necrosis, and each form may, and frequently is, accompanied by ocular symptoms.

Perhaps the simplest form of ocular discomfort which is apt to succeed a congestion of the nasal mucosa, with obstruction of the normal sinus outlets, as pointed out by Parsons (*Journal-Lancet*, 1913, page 332), is a unilateral headache with pain and some tenderness at the upper, inner orbital angle, aggravated by stooping, with or without some vertiginous sensation, congestion of the conjunctiva of the lid and eyeball, with lacrimation, muscular twitching and discomfort upon attempting to use the eyes for near work. The latter symptom will probably draw attention to a refractive defect, which

in itself may be an entirely minor element in the causation of the condition.

The vicious circle thus set into action, with the induction of so-called negative pressure within the sinuses, is a common observation. Middle turbinal pressure against the septum may be the contributive cause, and here recurrences may make it necessary to excise it in part.

As a rule the acute cases of sinus disease are not seen by the ophthalmic surgeon, as the family physician and nasal specialist are those consulted during the earlier manifestations, and unless the infection is an especially virulent one, causing external violent ocular symptoms, the opportunity to examine such expressions of disease is only afforded well on in the sub-acute or chronic stages.

The usual types of eye involvement in acute and chronic sinus disease are those with external manifestations such as edema, cellulitis, abscess; those without external signs but manifesting definite lesions of the ocular fundus; those with corneal, iritic, ciliary or general uveal inflammation and even glaucoma; those exhibiting the pressure signs of mucocoeles; and finally the unilateral pain and headache due to rarefaction of air in frontal or ethmoid which often expresses itself as violent asthenopia with or without definite pupillary, parietic or paralytic muscle phenomena.

SYMPTOMS.

The ocular symptoms of sinus disease, to which I will first direct your attention, is edema of the eyelids, on one or both sides, usually unilateral. Gerber claims it to be a very early symptom of orbital involvement. It may be present for prolonged periods, at times being typically fugitive and recurrent, varying from a slight flushing to a marked swelling of red or brawny type. Dr. de Schweinitz in 1910 (American Ophthalmological Society) emphasized these fugacious appearances as pointing just as definitely to sinus disease as the common edema more generally present. They are usually accompanied with unilateral pain, supraorbital neuralgia and frequently with burning on the affected side of the face, and can be an expression of disease in any one of the four sinuses, but are thought to be conspicuously evident in acute ethmoiditis and

frontal sinusitis. Edema tends to lessen as drainage is established, and if due to either of the latter sinuses is apt to be less in evidence at night and more in the morning. There is no doubt, however, that even a casual review of the literature will definitely place the maxillary sinus in the rôle of causation. Onodi, Digiseppie, Di Tito, Rollet, Genet, Freeman of this city and others have reported cases. In Freeman's case it was caused by only a few drops of pus in the sinus. If due to disease of the maxillary antrum the edema should be more marked during the day, if the patient is in an upright position.

This symptom must be distinguished from that caused by incipient hordeolum, as well as from the edema of an acute dacryocystitis, that from lid furuncle, or from the deep infiltration that precedes an abscess of the lids.

The edema accompanying periostitis of the orbital margin can, as a rule, be diagnosticated by the hard character of the underlying swelling.

In erysipelas the swelling and redness are uniform, the skin feels thicker and harder, and circumscribed infiltration is absent. The swelling occupies both, as a rule, and usually extends to the neighboring parts. The recurring angeioneurotic edemas allied to urticaria, and often associated with disturbances of the menstrual period, must be considered as well as those symptomatic of migraine. The edema accompanying acute eczema is also worthy of note.

Consideration of the noninflammatory lid edemas, associated with cardiac disease and nephritis, often appearing under the guise of edema fugax, must also be differentiated.

The edema of acute blenorrhea and diphtheria of the conjunctiva, iridocyclitis, uveitis and glaucoma are, as a rule, readily eliminated. The edema of a retrobulbar phlegmon or that expressive of a severe orbital cellulitis or abscess secondary to frontal or ethmoidal empyema must be, if possible, differentiated from the early orbital manifestation of thrombosis of the cavernous sinus. In thrombosis the lid and conjunctival swelling are marked, the eyeball is protruded and moves with difficulty. The retinal veins are enormously dilated, and there is apt to be a doughy edema in the mastoid region. In sinus thrombosis the edema and swelling are frequently bilateral, and this is rare in sinus disease. Thrombosis is apt very

promptly to lead to cerebral symptoms and a fatal issue. On the other hand, suppuration in the posterior ethmoid cells and maxillary antrum may, according to Fuchs, lead to sinus thrombosis, hence it will be readily understood how difficult at times absolutely accurate differential diagnosis becomes.

Our edema study can easily become more complex by the development of a meningitis, in association with oculoorbital disease of rhinogenous origin, and in this connection has been exhaustively studied by P. H. Gerber (*Komplikationen der Stirnhöhlentzündungen*, 1909), with an analysis of fifty-one cases from literature, as well as by Onodi, in his well known work (*Pathologie und Therapie der Nasenkrankheiten*, 1910).

To these have recently been added two cases by Dr. Samuel Leopold of our city, one with oculoorbital symptoms and a second with rapid brain involvement from influenza without demonstrable ocular signs, the first illustrating an intermittent frontal sinusitis with a final meningitic attack, and the second quickly terminating in a sudden apoplectiform attack. A third slow, insidious, protracted form is distinguished. When ocular complications are present we may have disease of the inferior sinus wall or orbital roof. Thrombophlebitis may indirectly produce leptomeningitis. Here again Leopold believes the lymph channels may also play an important rôle.

In both tenonitis and orbital cellulitis, secondary to sinus disease, edema of the lid and conjunctiva and proptosis of the eyeball are present. Again, according to Fuchs, if the chemosis is pronounced and the proptosis slight, tenonitis is probably in evidence. The opposite condition of affairs points to the deeper involvement.

Dr. Posey refers to a collateral inflammatory edema of the upper lids and orbit accompanying a periostitis in the presence of acute frontal and ethmoidal sinusitis, in which an exploratory puncture showed the presence of pus, under the periosteum, but to which an incision gave no added purulent matter.

Actual blackening of the lids at times occurs, suggestive of an ecchymosis, and this as the edema may be also recurrent. The value of this symptom was emphasized by de Schweinitz in his paper, "Some Observations of the Ocular Manifestations of Sinus Disease," before the American Ophthalmological Society, in 1910, and again in discussing Dr. Bryan's

paper before the College of Physicians. The appearance and disappearance of these lid manifestations are obviously dependent upon relief from an obstruction to drainage in frontal, ethmoidal and antral empyema.

Congestion of the conjunctiva and lachrimation are very frequently present, the former extending at times to a definite conjunctival catarrh.

Emphasis must also be placed upon the presence of a fugitive episcleral congestion, resembling the episcleritis periodica fugax of Fuchs, or the Hutchinson "hot eye."

The dilated and tortuous episcleral vessels are deeper in hue than those of ordinary episcleritis, are said not to bleach under adrenalin, and are apt to be accompanied with very violent headache. These attacks may last for weeks, as in a case reported by de Schweinitz, before the cause is suspected.

To these may be added curious corneal phenomena mentioned by the same writer, namely, edema of the corneal epithelium, resembling that induced by cocain or a so-called wrinkling of the cornea. Posey and Gerber have seen herpetic eruptions associated with sinus disease.

Of the inflammatory ocular conditions, as is well known by every ophthalmic surgeon, none is at times more baffling than uveitis and iridocyclitis. One of the earliest reports associating this condition with sinus disease was by Dr. Posey in 1897, November 16, before the Ophthalmologic Section of the College, where the eyes of a laundry worker became blind and the ball shrunken from a violent uveitis, the nasal and sinus condition being due to inhalation of acid fumes. The involvement of the cornea, iris, ciliary body and choroid, constituting this well known uveal picture, may have a very varied etiology, such, for example, as syphilis, tuberculosis, enterogenous intoxication of intestinal origin, gonorrhea and the toxic products from a diseased tooth, mouth, tonsil, skin, uterine cavity or accessory sinus, and it is perfectly possible that two of these sources of infection may be present at the same time, but since Ziem, Ebersbush (quoted by Brawley), and many other observers have associated these conditions with sinus disease, no study is complete that lacks sinus consideration.

Disease and abscess formation in the region of the lacrimal sac, giving the symptoms strongly suggestive of lacrimal mucocele, may be the so-called prelacrimal abscess and have their origin in the lacrimoethmoidal cells.

Alterations in refraction, the result of pressure from a dilated sinus is not an infrequently recorded observation and ciliary spasm and congestion, the outcome of nervous and lymphatic influences, may likewise contribute to the production of this phenomenon. Stewart of Portland (*Ophthalmic Record*, 1910) has seen three-fourths of a diopter against the rule disappear, after surgical treatment of a sinus.

I am entirely in accord with the view that these, and many others of the associated ocular and nasal conditions of indeterminate origin, but with at least a relaxed turgescence or so-called vasomotor hypertrophy may and should be relieved by general upbuilding, with iron for example, as suggested by MacWhinnie, or other tonics and supplemented by exercise, a change of climate, intestinal antiseptics and laxatives with appropriate local nasal treatment, with which you are all familiar, before operation is undertaken.

INFLAMMATORY ORBITAL SYMPTOMS.

Inflammatory conditions of the orbit are present in and the result of nasal sinus disease in 60 per cent of the cases according to Birch-Hirschfeld, of Leipsic, and indeed other authorities assign an even more important role to them in the induction of orbital cellulitis: Posey, for example, maintains that fully nine-tenths of all cases of cellulitis are secondary to sinus affections, and St. Clair Thompson (*London Ophthalmoscope*, 1908, "The Frequency of Orbital Manifestation of Nasal Sinusitis"), believes we should cease to regard orbital cellulitis as primary and should look to the nose and accessory sinuses for the infection. The inflammation often persists, notwithstanding the establishment of drainage by reason of the orbit being a closed cavity. The acute or chronic purulent sinusitis was due in Hirschfeld's cases to rhinitis, influenza, pneumonia, scarlet fever, diphtheria or traumatism.

The more frequent route of orbital infection from accessory sinus inflammation is by way of the floor of the frontal, the os planum of the ethmoid and the roof in the maxillary

sinus, the symptoms varying as the condition is acute or chronic. In the acute variety the eyeball is tender, there is usually pain upon rotation, a so-called orbital neuralgia especially upon concentrating the gaze, and tumefaction at the upper inner or inner angle involving the inner third or half of the eyelids.

If the fundus can be seen the veins will be full, the edges of the disc veiled, the surface of the nerve too red, or edematous with confusion of sight, diplopia, edema of lids, conjunctival chemosis, periorbital pain increased upon pressure, dimness of vision and a varying proptosis of eyeball depending somewhat upon the primary source of the swelling, being forward, downward and outward in front sinusitis, with limitation of upward and inward movement, more nearly directly forward in sphenoid disease, and forward, downward and inward (Skillern) in ethmoiditis.

The completion of the symptom complex will be dependent upon the degree of cellulitis and its extension into an orbital abscess.

The rapidity with which an orbital cellulitis secondary to an acute ethmoiditis may proceed to a fatal issue is illustrated in the case of Clegg, in which a girl of nineteen previously perfectly well, developed sudden headache and vomiting with great edema of the lids and reduction of vision to light perception. Temperature and pulse were normal. Drainage of orbit brought temporary relief, but death ensued in four days.

Hilfrich, K. J., in a paper upon "Intraorbital Complications in Acute and Chronic Accessory Sinus Disease," *Zeitschrift für Ohrenkrankheiten*, page 31, emphasizes the fact that swelling of the contents of the orbit causing protrusion, limitation of movement of the eyeball, diplopia and headache, marking the acute onset of exophthalmos, may be at times the only external sign of accessory sinus disease.

Mucoceles from the frontal and ethmoid are apt to be marked by the presence of a quiet tumor at the upper and inner or inner aspect of the orbit, dependent upon the involved sinus without active inflammatory symptoms causing displacement of the orbital contents with resulting exophthalmos down and out. This may be combined with polypoid formation and evident ethmoid disease or as in a case of Reber's

can exist with an entirely negative rhinogenous finding. In the latter case a spray of antipyrin, cocain and adrenalin several times a day for about ten days suddenly resulted in a gush of thick jellylike fluid from her throat, causing a complete disappearance of all the symptoms.

These mucocoeles may result in a periostitis of the frontal floor or over the os planum. A subperiosteal abscess may result and may either be encapsulated or penetrate the skin of the lid.

Axenfeld maintains that the distinction between osteoma and mucocoeles, many of the symptoms of which are allied, may be made by the X-ray.

The enlargement caused by mucocoeles is often of almost bony hardness suggesting an exostosis. A tense parchment like appearance is apt to be followed by crepitation or fluctuation.

The slow growth permits an ocular adjustment, therefore there is frequently no diplopia and the failure of the optic nerve to show any radical departure from normal is explained by its straightening at the sigmoid flexure without pronounced stretching (Posey).

Gummata of the upper inner angle of the orbit may present symptoms closely simulating mucocoele distension as in a case of Zentmayer's and a second of F. C. Parker, and here when doubt exists as to each diagnosis the modern syphilis tests are invaluable.

The ocular changes secondary to sinus disease appear usually in adult life, but a number of well recorded cases appear in infancy and early childhood.

Drs. Frederick Krauss and William Campbell Posey of this city, for example, have reported cases of orbital abscess secondary to maxillary sinusitis. In Dr. Krauss' case the disease appeared at four months and in Posey's between one and three years. Posey had originally regarded them as osteomalacial in origin.

Onodi records the size of the maxillary sinus at one year of age as 5 by 3 millimeters up to 19 by 8 millimeters in size, and in fetus of six and one-half months the same author found a maxillary sinus 3 by 1.5 millimeters.

OCULAR MUSCLE INVOLVEMENT.

This aspect of the subject has been carefully elaborated by Savineau, Peyser, Galezowski, Bernheim, Posey, Reber and others.

Interference with the mobility of the eye usually results from mechanical displacement associated with a distended sinus wall or from the presence of exudation, yet asthenopia, paretic or paralytic conditions of the ocular muscles do occur in sinusitis entirely apart from such displacements and occasionally may be an accompaniment of even a mild sinus involvement. These later cases, as Bernheim and Skillern suggest, are apt to be the result of the selective action of a toxin just as is true of the infectious diseases, autointoxication and influenza.

The anatomic relations will readily point to the frontal cells as responsible for involvement of the superior rectus, superior oblique and the levator, and Savineau has associated the internus and accommodative muscle involvement with frontal disease, although the lack of power in the interni usually points to ethmoidal diseases and that of the inferior rectus and inferior oblique are most apt to indicate antral disturbance.

The intimate association of the nerves which supply the ocular muscles with the outer wall of the sphenoid will readily explain in part the muscle disturbance, and disease of the sphenoid is regarded by some authorities as the most frequent cause of muscle involvement of sinus origin. The ethmoid frontal and antrum probably offend in the order mentioned.

In acute cases pareses or paralyzes are occasioned by direct inflammatory infiltration of the long flat belly of the muscles themselves as they lie close to the sinus walls or by involvement of the nerves as they enter the orbit.

In many instances diplopia is not complained of, but is detected by the red glass and a search in the peripheral field. Diagnostic help is gained by noting the pain when the eye is turned in the position that calls forth the greatest movement of the affected muscle.

The use of the eyes is difficult and painful, confusion of vision, vertigo and reflex gastric disturbance are frequently present.

Alternate dilatation and contraction of the pupil is reported by McBean of Chicago in a paper upon variations in the sphenoid sinus (ANNALS OF OTOTOLOGY, LARYNGOLOGY AND RHINOLOGY, 1914) and two cases of pupillary dilatation in sphenoid disease are reported by Sluder.

The condition was one of acute sphenoiditis in McBean's case, with pain back of eye and in occiput with severe asthenopia. In a few days wide dilatation of pupil was followed by myosis, with spasm of accommodation. All local medication was resisted and the case cured by an autogenous vaccine. McBean regards the explanation of the phenomena as an irritation of the carotid plexus of the sympathetic producing mydriasis, and considers that later motor oculi irritation produced myosis.

Baumgarten and Lapersonne are quoted by Onodi as also having seen oculomotor paresis and paralysis from sphenoidal disease.

The picture of complete palsy of the levator palpebrarum (right) frontal sinus empyema is apt to include severe neuralgic pain in the supraorbital and frontal region with marked tenderness upon tapping. In one case reported by Posey the globe movements were unrestricted. Conservative treatment to the frontal sinus by Dr. George B. Wood in this instance caused a rapid improvement. The close apposition of the muscle to the sinus floor and the absence of sphenoid and ethmoid disease established a diagnosis of direct involvement.

It is not always easy to differentiate between edema and paralytic ptosis, each at times being fugacious and recurrent.

In the more chronic types of sinusitis the disturbance of the eyeball is slow because the sinus distension is very gradual and the muscles adjust themselves to varying conditions.

The so-called rheumatic ocular palsies are thought by a number of authorities to be more often due to sinus disease.

It is perfectly well known that many of these ocular palsies are due to specific disease and every oculist of experience has seen cures result from large doses of the iodids, but if the possibility of sinus origin be kept in mind we will frequently produce a rapid cure by the sinus route.

OCULAR FUNDUS CHANGES UNACCOMPANIED BY EXTERNAL
INFLAMMATION.

An exhaustive ophthalmoscopic and perimetric examination becomes of especial importance in those cases of sinusitis in which changes in the fundus oculi are present without any external signs of orbital or ocular inflammation. These changes may be retrobulbar neuritis—a papilloedema or choked disc, an optic neuritis—neuroretinitis, thrombosis or phlebitis (de Schweinitz), retinal detachment and finally definite blind or blurred areas in the visual field without ophthalmoscopic evidence of ocular disease.

The areas of greatest significance in the study of intra-ocular disturbances are two in number, first the macula with its acute recognition of white and color, and second the optic nerve at its point of entrance into the eyeball, the latter being the so-called "silent" area or the blind spot of Marriot.

The presence of symptoms of optic nerve involvement (as emphasized strongly by distinguished authorities) are the most dangerous of the sinus pointings and if not relieved by suitable drainage may be followed by atrophy. If these changes are unilateral they especially call for sinus study.

The importance of repeated field examination in arriving at a more definite diagnosis is emphasized by such a case as reported by Heed, where a female of thirty-nine complained of blurred vision and vertigo and in which a fundus examination showed only a suspicious hyperemia of the disc but with normal fields. Five days later an active neuritis with contracted fields existed. Treatment to ethmoid cells caused a rapid cure.

The presence of a central scotoma in the absence of any demonstrable ocular involvement in the media, retina or choroid points definitely to a macular lesion and is pathognomonic of an axial orbital or retrobulbar neuritis, which is ordinarily caused by the circulation of an infecting agent in the blood, this toxemia inducing an interstitial inflammation of the so-called papillomacular bundle of the nerve most marked in the optic canal. For these fibers certain toxic products have a special affinity, and the scotoma when present is usually first for colors and later for white.

This toxemia as a rule results in a temporal pallor of the disc, but the discovery of the scotoma precedent to the change in the appearance of the disc usually points to the need of immediate improvement of sinus drainage and hence may warrant operative interference when no demonstrable signs of sinus disease are present. If the infecting agent manifests its baneful influence on the intraocular end of the nerve as a choking of the disc, and actual neuritis or further extension into the retina, these significant ophthalmoscopic pictures can readily be determined.

The perimetric findings associated with or the direct outcome of sinus inflammation, have been carefully studied by a considerable group of observers, prominent among whom are: Birch-Hirschfeld, Fuchs, Jessup, Zien, Van der Hoeve, de Kleyn, Markbreiter, Ramsey, Southerland, Samuel D. Risley, de Schweinitz, Knapp, Reber, J. Norman Risley, MacWhinnie, F. J. Parker, Friedenbergs and Peter.

There may be concentric or irregular contractions both for form and colors and occasionally bitemporal hemianopsia (Evans-Birmingham), but the scotomas of varying types are more generally present, have more diagnostic significance and indeed those of the so-called peripapillary variety have been regarded by some observers as practically pathognomonic. As the sinuitis is more usually unilateral, so is the central scotoma. This fact has received special emphasis by Weeks of New York, but this will of course vary with the extent of the sinus involvement and may be bilateral and be present both for form and colors. The scotomata of the more usual toxic varieties caused by the various systemic toxemias are much more apt to be bilateral.

In our study of central scotoma three important groups representing varying types of causation must be considered from a differential viewpoint.

First: Toxic amblyopias caused by alcohol, tobacco, lead, arsenic, iodoform, stramonium, carbon dioxide, mercury, opium, malefern, etc.

Second: Intestinal toxemia, syphilis, tuberculosis, diabetes, gout (so-called), gonorrhea, influenza, malaria, the infectious fevers.

Third: The mouth, teeth, tonsils and accessory nasal sin-

uses, and it has been generally believed that the posterior sinuses are the special offenders.

It must always be kept in mind that one or more of these systemic conditions may be responsible for a toxemia which induces the nerve changes or may result in the sinus empyema, which in turn may be the direct excitant of the nerve or retinal lesion. Hillizter (*Wien. klin. Rundschon*, October 8, 1911) believes optic nerve conditions due to involvement of the ethmoid and sphenoid sinuses are as a rule diagnosed by exclusion.

In the absence of intoxications with a negative Wassermann the presence of an axial or retrobulbar neuritis, acute or chronic (especially if unilateral, since in the former condition the nerve disturbance is usually bilateral), the possibility of a disseminated sclerosis should be carefully considered and under such conditions disturbances of gait-sensation, reflexes should be studied, and indeed if a sinus infection is present, such as ethmoiditis, for example, combined with the symptoms of disseminated sclerosis, as was true in a case reported by Shumway, the possibility of the toxin from the purulent focus causing the nerve degeneration as suggested by that author must likewise be kept in mind.

The differentiation between the fields of vision and intra-ocular states due to sinus disease and those due to or associated with general toxemias, in which no sinus disease was suspected nor present, are, as pointed out by S. D. Risley, sometimes exceedingly difficult to make.

Central scotoma, narrowing of fields, edema of fundus, veiling all details, large dark tortuous veins, hemorrhages in fibre layer of retina or at the macula may be present and yet it may be impossible to demonstrate sinus disease. On the other hand, all of above symptoms may be present in association with disease of one of the sinus in the anterior segment of the skull and it is not always easy to say they were caused by it, as both the sinus and ocular disease were associated with and probably caused by the same systemic toxemia.

Paracentral scotomas of horseshoe shape, disappearing in segments, are described by MacWhinnie and a similar variety is emphasized by de Schweinitz, the paracentral often be-

coming hemianopic and resembling the hemianopic scotoma of Treitel.

The crescentic field defects, such as reported by the same author in a case of posterior ethmoiditis combined with tooth abscess, may be part of a ring scotoma, either previously present or not yet completely formed and easily influenced by measures to remove the toxemia, that is to say, treatment of sinus and tooth.

The ring scotomatas may become central and usually improve and disappear with adequate drainage unless permanent damage has resulted from the pressure or toxemia.

The presence of a ring scotoma according to MacWhinnie (quoted by Friedenberg), would indicate accessory sinus involvement even when the retained infection was not evident to the probe. When inspection of the nose points to definite sinus involvement, especially posterior, a typical field will be an enlargement of the blind spot and a paracentral scotoma.

The nerve lesions in central amblyopia consist in edema and proliferation of the glia cells and later possible destruction of the nerve fibre (Birch-Hirschfeld). The cause, according to Birch-Hirschfeld, is venous stasis and toxic agencies.

Bryan believes that nerve toxemias can be caused by mucocoeles as well as by abscesses and the symptoms often extremely difficult to explain may be the result of anomalies in the posterior cavities. The sphenoid may be in relation to both nerves. The posterior ethmoid may be, on the other hand, in close proximity to one and not to the other, and furthermore, it is Bryan's opinion that the presence of bilateral nerve involvement may be explained by transference by way of the chiasm without necessarily indicating the presence of a bilateral sinusitis.

In such a study as this special emphasis should be laid upon the work of Van der Hoeve and its further development and confirmation by de Kleyn.

The enlargement of the blind spot constituting the so-called peripapillary or Van der Hoeve scotoma, has been thought to be pathognomonic of involvement of the posterior group of cells (sphenoid and posterior ethmoid); this toxemia ex-

pressing itself upon the peripapillary bundle as the first portion involved in a retrobulbar neuritis.

In attempting to outline a Van der Hoeve phenomenon it must be remembered that the optic nerve as it enters the eye has no ganglion cells, no rods nor cones, and is therefore blind.

This blind spot is located 15° to the temporal side of the actual point of fixation. In hyperopic eyes it is further away as far as 19° , while in myopic eyes it is down to 11° . As to the important question, what actually constitutes an enlargement of the blind spot, Van der Hoeve considered over 6° in the horizontal diameter as suspicious and over 7° as too large.

Van der Hoeve found the peripapillary scotoma only in posterior sinus disease, and maintains that central scotoma, always secondary to sinus disease, appeared later if at all; whereas in toxic retrobulbar neuritis this symptom and the Van der Hoeve scotoma were present simultaneously. De Kleyn noted that the enlargement of the blind spot for colors preceded that for a white.

The presence of this symptom according to some authorities justifies an operation on the affected sinus if no other cause for the blind spot enlargement can be found.

These deductions we will probably modify by reason of the more recent work of Markbreiter in an important paper on the changes in the visual fields in diseases of the nose and accessory sinuses, in which he reported results of investigations of the fields in one hundred cases of empyema, carefully excluding all cases in which the eye itself manifested any changes that might cause any visual field disturbance.

In this series of cases sixty-three involved the anterior group of cells, and of this series seventeen were frontal and thirty-one maxillary, three anterior ethmoid and frontal, nine involved the posterior group, three were cases of pansinusitis, and in the remaining twenty-five the exact location is not specified.

Visual field changes were found in seventy of the hundred cases, although the fundus in each case was normal and the vision perfect. This, it seems to me, is a very important observation.

In the anterior empyemas, field changes were present in forty-eight out of sixty-three cases and in seven out of nine in the posterior group.

Of the seventy cases of defective fields the blind spot enlargement was present in fifty-two, seven showed central and eleven other forms of field defect, such as island ring defects and peripheral contraction.

Markbreiter has never seen enlargement of blind spot pass into central scotoma.

In eleven out of thirty-seven nonsuppurative diseases of the sinuses, field changes were present.

The further important deduction from this study is, that while enlargement of the blind spot constitutes the most frequent of the nerve manifestation of accessory sinus disease, it presents no diagnostic features by which we can positively say whether the anterior or posterior group of cells is involved.

The fact, however, that enlargement of the blind spot may sometimes be present, either with or without surrounding rings of color scotoma, and the further fact that these scotomas may antedate by some considerable time organic changes in the nerve head or other gross ophthalmoscopic alteration, is an exceedingly important observation of Van der Hoeve, de Kleyn, Onodi, and has been confirmed by a number of American observers (de Schweinitz, Norman Risley), and while it may not definitely indicate which sinus or group of sinuses is involved, it constitutes a very significant signpost in the direction of sinus disease.

Optic neuritis and neuroretinitis may be caused by an inflammation of any of the nasal sinuses. In a case reported by Arnold Knapp resection of the anterior half of the middle turbinal and curetting of the posterior ethmoid caused a return to normal vision and fundus, and eliminated a central relative scotoma for white and colors.

An optic neuritis in which the summit of the disc was plus four with an ocular proptosis and reduction of vision to one-fifth of normal, in which frontal ethmoidal drainage by incision under the orbital rim from a point under the middle of the front inward to the nasal front and downward along

its border, with complete recovery, was reported by Dr. Risley. This procedure was adopted in 1903, and the patient, whom I saw this past week, has scarcely any deformity and normal vision. This author much prefers the procedure here adopted as offering adequate drainage and a very inconsiderable scar.

Monolateral optic neuritis may exist for a prolonged period with normal vision as in the case reported by Rau, where a systemic treatment caused marked improvement in a case lasting a year. Recurrence was noted in two years with decreased vision, frontal headache and pain on percussion over the frontal sinus. Examination now showed a maxillary sinusitis of the same side, operation upon which cured the neuritis and largely restored vision.

This case emphasizes the fact that pain is not an absolutely reliable guide, as none was present over the maxillary and all over the frontal.

The tolerance of the optic nerve and retina to interference of toxic products of or direct pressure from ethmoidal empyema, is well illustrated by a case reported by Dr. S. D. Risley ten years ago, before the association of these conditions was by any means so generally recognized. It likewise confirms an equally important observation that the ordinary depleting, absorbing and eliminating measures so generally applied to cases of neuroretinitis with flame-shaped hemorrhages and contraction of the field, will frequently cause amelioration of all the symptoms. The recrudescence of the ocular condition in this instance caused the consulting neurologist to fear intracranial involvement. Operation on the anterior ethmoid cells and consequent drainage of frontal and ethmoid resulted in a complete cure, the latter not having been performed for two years after the initial symptoms.

I venture the opinion that all of us today would immediately take the sinuses into account at an initial visit in the presence of a unilateral neuroretinitis, with or without hemorrhages.

The case of a physician recorded by Parker of New York with concentric contraction, central and Van der Hoeve scotomas, varying with the conditions of the sphenoid and posterior ethmoid cells combined with double papilloedema, is of special interest.

The maxillary antrum was also involved, but the cure of the ocular condition followed operative treatment directed to the ethmoid and sphenoid sinuses, vision at one period being reduced to shadows in each eye and returning to normal only when the last posterior infected cell had been drained.

Retinal thrombosis as symptomatic of sinus disease is referred to by a number of writers, Wendell Reber reporting a case of thrombotic involvement of the central retinal vein which was negative to all types of examination, even rhinologic. In his characteristic phraseology he pictures the nasal disease as sweeping in, doing its damage and possibly disappearing by the time the retinal disease is apparent, notwithstanding a negative examination so far as empyema was concerned he insisted upon rhinological local nonoperative treatment and a cure resulted in four weeks.

Reber believes many of these cases of thrombosis of the central vein are due to undiagnosed latent obscure sinus disease which need not be purulent.

In this perhaps too prolonged recital many vital points have been left for consideration and review by the specialists present whose extensive experience and reputation entitle their pronouncements to the most distinguished consideration.

These subjects include the importance of blood study with hemoglobin determination and differential count, the relation of blood pressure, intestinal toxemia and the varying infections, the conservation of tissue as opposed to its destruction and removal, the value and limitation of vaccine therapy, the bacterial study as indicating the extent to which conservative treatment is justified, the limitations of X-ray and transillumination as adjuncts to accurate diagnostic study, the best conservative nasal treatment, which, according to one author (MacWhinnie), will cure ninety-seven per cent of these cases, the value of suction in the conservative management, and finally the most approved operative intervention so often essential to the preservation of vision and at times to the prevention of meningitic involvement.

The important opinions of the participants in the discussion of the evening have been dug out of the mines of the years of toiling in an effort (in the apt phraseology of Edward Jack-

son) to "Push back the ever widening margin of the unknown."

If our interdependence in our closely allied fields of endeavor has been given an emphasis, the purpose of the writer will have been achieved.

XXII.

OSTEOMA OF THE FRONTAL SINUS, WITH A REPORT OF THE CASE.*

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The comparative rarity of frontal sinus osteoma is only one of its interesting characteristics. In its study we are reminded, as Gerber has said, of certain similarities with that most interesting tumor, the true nasopharyngeal polyp. These two tumors present the peculiarity of benignancy of histologic structure but malignancy of effect upon surrounding structures. Both are tumors which except for the location would be given little thought.

The extension and consequent destruction that the nasopharyngeal polyp can produce cause us to view this tumor in its advanced stage with little short of horror, and in the olden times the frontal sinus tumor furnished an equally dismal prognosis. Berlin has passed himself down to posterity as advising the enucleation of the eye, for example, where a frontal sinus osteoma had broken into the orbit, rather than try to remove the tumor.

Bony tumors of the skull and in the region of the sinuses and orbit were a source of considerable mystery to the old physicians. Paget describes one such tumor occurring in the ox which had the enormous weight of 16 pounds. "Petritified brains" was a name given to these often large and irregular bony masses. Their frequent occurrence in domestic animals led to their earlier recognition there. Home in 1799 referred to tumors of the frontal sinus. Bouyer in 1841, Paget. Weiss also had dealings with them. In 1854, however, the extent of knowledge on the subject may be judged by the statement by Wm. McKenzie, in his treatise, that he knew of no case of frontal sinus osteoma in the literature.

*Read at the meeting of the American Laryngologic Society in Los Angeles, February 21, 1918.

Cruveiller, the eminent French pathologist, in 1856 was the first to give a description of these tumors, that has any real value. He called them "Corps Osseux Enkystes." He believed they developed in the diploe between the two tables of the skull and growing, forced the lamella before them as a capsule or ruptured it.

Virchow studied the subject and was also of the opinion that these tumors originate usually in the diploe and grow inward into the sinus, breaking through the inner table of the skull or carrying it forward as a capsule. He referred to them as enostoses in contradistinction to exostoses.

Spencer Watson was the first to think that these tumors had origin from the ethmoids and the neighboring sinuses.

Arnold in 1873, in considering their origin, brought into the vexed question as to their exact source the suggestion that they probably developed from cartilaginous developmental rests. Following Conheim's dictum that where in development embryologically different tissues come together there is a predisposition toward tumor growth.

In 1881 Bornhaup reviewed the literature and gathered cases that showed the condition was not as rare as had been formerly supposed. He was, however, unable to settle the question of etiology, but considered them of periosteal origin: exostoses. He studied forty-nine cases of encapsulated tumors of the frontal region, twenty-three of these were of the frontal sinus. Most of these forty-nine tumors had origin in the immediate neighborhood of the ethmoid cells.

The ethmoid cells are developed in cartilage. The frontal bone is developed in membrane. The point of union between these bones, that is, the vicinity of the ethmoid cells, is where the extraordinary development of these regions takes place and where cartilaginous rests would occur.

Hucklenbroich, in a splendid review published in 1906, brought the number of cases in the literature to 59.

Gerber in 1907 counted eighty-seven cases. He devoted considerable space to the discussion of the origin of the tumors and did not agree with Arnold's theory. He rather leaned toward the view that they may be due to sinus infection, the infection possibly transient.

Since 1907 there have appeared in the literature the following cases: Corgill, one; Pfeiffer, one; Citelli, one; Hastings, one, in a dry skull and not included by Gerber. This brings the number of cases including the one here reported up to ninety-three.

There is some question as to the exact number of cases that should be listed as frontal sinus osteoma because where the site of origin is at the junction of the ethmoid and frontal bones, the location may be said to be determined by the sinus that contains the greater part of the growth, as it may grow into several sinuses.

The tumors have in the past been often diagnosed by ophthalmologists because of their extension into the orbit. H. Knapp found four such orbital osteomas in 56,000 cases. They occur more often in frontal than the other sinuses.

Kikuzi in an analysis of fifty-four cases found that twenty-six were of frontal sinus, two of nasal cavity, eleven of ethmoid, ten of antrum, five of sphenoethmoid.

Etiology.—Etiology has never been definitely determined and forms one of the most interesting features of the subject. Osteomata occur on other parts of the body without any possibility of determining the cause. There, of course, must be some cause or predisposing factors to disturb the normal development of the bone. I do not believe we have arrived at a satisfactory explanation as yet, though giving honor to the ingenuity that has endeavored to explain the origin of these frontal sinus osteomata.

The attractive theory first promulgated by Arnold, that they were the growth from developmental cartilaginous rests is hardly tenable. His idea was based upon the fact that, inasmuch as the ethmoid bone is developed in cartilage and frontal bone in membrane, developmental cartilaginous rests may occur at their point of union there. There is much that can be said in favor of this interesting hypothesis, but the one fact that these tumors have been found with their point of origin surely and distinctly at some point in the sinus wall well removed from the ethmoid, is sufficient to controvert it. My case is of this type. No cartilaginous debris has ever been found in these osseous tumors. They occur most often in young people, but most bony tumors occur at the time that

the bone is undergoing its greatest developmental activity. The frequency of these tumors in the frontoethmoid region is not to be wondered at when we consider the great activity of growth that takes place in the formation of the sinuses, after birth. It is a recognized fact that osseous tissue wherever situated in the body reacts to trauma by a proliferation of its elements. However, it has been impossible to fix trauma as the causative factor. They often occur in patients whose history is negative and whose health is otherwise normal. According to Killian, they are not due to growth from the osteophytes that one finds in chronic sinusitis. Different forms of bony tumors of the frontal sinus, osteophytes, exostoses, osteomas, are found with not great rarity in the dissecting room. They are more frequent in the male and between the ages of ten and thirty years. The tumors are not always solitary.

Gerber was of the opinion that the tumors originated because of certain changes caused by infection in the sinuses. We know that such infections, often transient, are more or less frequent. A certain proportion (37.5, Hucklenbroich) of all cases are complicated by sinusitis. However, evidence is lacking to prove sinusitis the cause of these growths.

Pathology.—These so-called encapsulated tumors are made up of a hard, often eburnated outer coating or bony capsule, surrounding a more or less cancellous center. The Haversian canals and lacunæ where present are irregular in form and arrangement. There is usually a pedicle joining the tumors to some part of the sinus wall. This pedicle is cancellous in structure. There are a number of cases on record where this pedicle has become detached and the tumor rested free in the sinus. Such are known as dead osteomata. Dolbeau first called attention to them. Tillmans also devoted an excellent article to their occurrence and description. The degree of hardness varies. The white eburnated surface of some tumors led to the name of the earlier writers, "ivory" tumors. They are usually irregular in form, often taking shape from the confining walls. A cross section may show concentric or radiating striæ. They are covered by a connective tissue capsule, perhaps polypoid degeneration, the remains of the lining of the sinus. Unless detached they continue to grow

and are not limited by the containing walls, but press them aside and may, and actually often do, cause their erosion. One is on record the size of a billiard ball. The rate of growth is to be figured in years rather than in months. In rare instances it has been of sufficient rapidity to lead to a diagnosis in less than a year, but in most cases one, two or three years elapsed before the report of the case. One case was only reported after twenty-six years.

Symptoms.—The symptoms may well be divided into two classes, those produced by the tumor while contained in or limited by the sinus, and those caused by its invasion of other cavities of the skull.

In the first class, most prominent and constant is pain or headache due to the pressure of the growing tumor. Up to a certain size, however, the tumor probably always develops without symptoms. The pain may be in the region of the sinus or may radiate even into the occipital region. The tumor in its growth may lead to certain complications within the sinus. It may cause a degeneration of the mucous lining. This, through swelling, may close the ostium frontale, and cystic degeneration and accumulation of fluids may take place. This condition is known as mucocoele, and the increasing contents of the sinus may lead to a great thinning of the walls with ultimate rupture and fistula formation.

Hucklenbroich found two cases of mucocoele in sixteen cases, 12.5 per cent, and six cases with sinusitis, or 37.5 per cent. The sinuses may become infected and through inadequate drainage into the nose form the typical picture of a chronic purulent sinusitis. These tumors in their growth naturally follow the path of least resistance.

The symptoms of the second class depend upon the cavity involved and the extent of the encroachment. It is to be hoped that henceforth these tumors will be diagnosticated before great damage is done. In the records, however, that come down to us from olden times, the diagnosis of this particular type of tumor was made from the position taken by the embarrassed eyeball. Extensions into the nose, or brain went much longer unrecognized.

The classical picture then given, pointing to invasion of the orbit from a frontal sinus osteoma was "proptosis of the eye-

ball, accompanied by outward and downward displacement." It is needless to go into detail as to the variety of damage to sight and the eyeball that would result from such displacement.

Diplopia and optic nerve derangement may be mentioned as prominent and important symptoms. Tumors growing into the nose may lead to external deformity and to internal obstructions. Growths have been reported fairly filling the nasal fossæ.

Extension toward the brain has in the cases reported given rise to symptoms only in the terminal stage where meningitis has developed. Though the headaches may be attributed partly to dural irritation, on the other hand, some of the pain has been thought to be due to direct pressure on the supraorbital nerves lying in the roof of the orbit. The adaptability of the brain to slowly increasing pressure is well shown in the absence of symptoms in many of the cases reported where there was considerable encroachment on the anterior fossa. Exostoses from the inner table of the skull growing inward, on the other hand, often lead to brain symptoms, even epilepsy. Although we would hardly look for the anterior frontal wall to be much disturbed on account of the relative thickness, it is a fact that it is often, especially in double sided tumors, driven forward typically in the region of the glabella. The distension of the cavity is more often accomplished by the cystic and septic contents than by the tumor itself.

Diagnosis.—Besides the clinical symptoms and signs given, the importance of the X-ray in establishing a correct diagnosis should be emphasized. Credit for the suggestion for the use of the X-ray for the diagnosis of frontal sinus osteoma is given to Taranto. Perthes in 1904 published the first occasion of its use for such purpose. It is today undoubtedly the most important method of diagnosis we have.

Huchlenbroich writing two years later gave importance to other methods of diagnosis. He spoke of transillumination, percussion and sounding and washing out of the sinus. Of the X-ray he wrote, "how far the X-ray will serve us is as yet not known, as there are but few observations on its use."

Cargill in 1912, Citelli in 1913, both made use of the Roentgen ray with advantage, and in my case it was the chief

means of making a diagnosis. The size and extent of these tumors are of great importance from the therapeutic standpoint and this has been determined in most of the four cases reported. Apposition to one or another wall of the sinus has been determined.

A bony tumor appearing at the upper inner angle of the orbit suggests always a sinus tumor. However, it may be only an exostosis from the orbital wall and the X-ray is valuable in pointing out here a proper diagnosis. One needs to read the surgical history of these tumors to realize the difficulties that the X-ray has penetrated for us.

A swelling typically located, with fistula, leading into the sinus is almost diagnostic, but here again we may have to exclude a simple cyst that rarely arises from one of the glandular elements in the mucous lining of the sinus.

Prognosis.—This has been radically changed since the advent of aseptic surgery. For this reason the older statistics are of little account. In the earliest cases death followed so commonly that they were looked upon by some of the ablest surgeons as inoperable. Bornhaupt found a mortality of 63 per cent in eleven operated cases. In seven cases the patients died with brain complications. In two cases the end result was unknown. In only two cases was there a radical cure. As said before, most of these cases were before the days of asepsis.

Hucklenbroich reports statistics of cases operated upon between 1850 and 1874. Twenty-eight cases with 28.6 per cent mortality, and between 1870 and 1900 three deaths in forty-six cases, 6.5 per cent. Some of these cases were possibly not frontal sinus osteomata, strictly speaking. There were no deaths, according to his own statistics, based upon fifteen cases gathered from 1900 to 1905.

Surgery of the frontal sinus was greatly advanced by Kilian's work. It is especially where the sinus is badly infected and free drainage is necessary that the surgical principles worked out by him are appreciated.

Treatment.—The treatment is complete surgical removal of the growth by external operation. This means has been employed for generations with the gradual improvement noted under prognosis. A history of the development of our pres-

ent technic chronicles some experiences demonstrating the courage of the old surgeons, as well as the fortitude of the patients.

Bouyer reports a case in 1841 of a frontal sinus osteoma in a man of thirty-four. He gave the patient fifteen drops of laudanum and attacked the growth, the patient sitting in a chair. After some hours of hammering and chiseling he succeeded in removing the growth. He gave the patient fifteen drops more of laudanum and put him to bed. He was about in a few days.

All sorts of incisions in the skin have been used to reach the tumor. The extent and location of the opening must depend upon the clinical picture. The X-ray can help here again by giving an accurate idea of the extent of the tumor. Where possible, the technic of Killian is ideal and this incision can be joined by vertical ones, preferably in the median line, when necessary. The anterior wall is to be removed widely enough to permit of easy access to the tumor and its dislocation and removal. Where possible the superciliary ridge should be preserved for cosmetic purposes.

When the tumor has been removed and the contents of the sinus cleaned out, the question of drainage arises. The natural drainage is downward and should be established as per the Killian method where the nature of the contents of the sinus makes drainage necessary.

If reasonable presumption leads one to think that no drainage is necessary the wound may be closed, or a bit of gauze put in at the external angle of the wound.

Case Report.—Mr. C. N., a Dane, age twenty-five years, occupation engineer, came to the Neurological Clinic of Stanford University, October 3, 1917. He was referred from another hospital with the following letter, which is included to show the serious status and the grave condition that was simulated:

"The bearer is a rather obscure neurologic case. We are therefore sending him to your clinic for the benefit of any further diagnostic and therapeutic suggestion which you might be able to make. The patient's history is negative, except for the following facts: Headaches ever since he can remember, formerly frontal, now occipital, more severe,

occasionally associated with fever. Instrumental birth. Two falls on head in childhood which dazed him for several hours. Usual children's diseases. No acute infections. Venereal diseases denied. No convulsions. Has had definite dream states. Physical and neurologic status show nothing of importance. Eyeground negative. X-ray examination of skull and spine negative. Urine negative. Blood—red blood corpuscles, 5,000,000; white blood corpuscles, 11,000; polys, 64 per cent; Wassermann negative. Spinal fluid puncture repeated one week after first—clear, colorless; pressure not increased; cell count 40-50 cells per cm.; Nonne markedly positive; sugar negative; Wasserman negative; differential, mostly lymphocytes. A specimen has been sent for examination for tuberculosis; report not yet available. Diagnosis: Probable diffuse tumor of brain."

Examination.—October 5, 1917. Complains of headaches in back of head on left side and directly over left eye, all his life, formerly in front of head. Since 1906, present location. Formerly headaches two or three times a week, now continually since three months, growing in intensity. Has lost about thirty-five pounds in six months. Feels well otherwise. Appetite is good. Sleeps well. Pain ceases when he goes to sleep. Is awakened by pain and walks floor about once a week. No headaches since entering hospital. No trouble with nose. No discharge. No trouble with throat. No tonsillitis. Fairly well built, somewhat undernourished male of about five feet eleven inches. Skin of face somewhat pale.

Head.—Shape not particularly abnormal.

Chest.—Moderately well formed. Symmetrical.

Lungs.—Vocal fremitus; tactile fremitus apparently normal.

Percussion.—No particular abnormality. Bases low, eleventh spine, equal. Breath sounds harsh bronchovesical right apical region. No rales.

Heart.—Position, maximum impulse not seen, left border just inside the nipple line, fourth space. Right, beneath the sternum. Sounds of moderate intensity and duration clear, regular.

Pulse.—Regular, moderate volume tension.

Blood Pressure.—Systolic, 110; diastolic, 70.

Abdomen.—Symmetrical. No tenderness. Liver not felt. Spleen felt finger breadth below costal margin. Not tender.

Genitalia.—No particular abnormality noted.

Extremities.—No particular abnormality.

Glands.—Few anterior cervical. Few inguinal. Epitrochlears rather large.

Reflexes.—Tendon, active, equal. Superficial, moderate, active equal. No Kernig. No rigidity of neck. No Babinski. Muscular force fairly good. Sensations apparently normal. No ataxia. No Romberg.

Spinal Fluid.—Pressure 70 mm. Total cells, 2. White blood cells, less than 1.

Nonne negative.

Noguchi negative.

Eyes.—Pupils unequal, right larger than left; both react, but that of right slower.

Vision.—20/20 each eye. No central scotoma. Color perception normal. Fields normal for white and color.

Nose.—Right, normal; a slight deflection of septum. Left, normal. No evidence of discharge.

Pharynx.—Small tonsils, nothing of importance seen.

Nasopharynx.—Clear, normal.

Ears.—Right, normal; left, normal.

Larynx.—Normal.

Hearing.—Schwabach normal. Weber not localized, Rinne positive, right and left. Right: watch, 36/36 low whisper, 15/15. Left: watch, 36/36; low whisper, 15/15.

Labyrinth Examination.—Normal.

X-ray Report.—Examination of skull shows presence of an abnormal shadow within the left frontal sinus, apparently causing some enlargement of the sinus. Skull otherwise negative. Nature of this growth radiographically doubtful, polyp or new growth.

Diagnosis.—Osteoma of left frontal sinus. Advise removal.

Operation, October 11, 1917.—Brow not shaved. Killian incision, frontal sinus entered, leaving the orbital ridge intact. In taking away anterior wall of sinus I had cut into tumor before I realized that I was in the sinus, as the tumor

was in perfect apposition with anterior wall at that point. The remainder of the anterior wall of sinus was removed and then the tumor was elevated with a small lever and removed. No attachment to the sinus walls was found and probably none existed, but cannot say definitely because of having cut into the tumor at one point. That may have been the area of attachment. If so, it was attached to the anterior wall and is a case in point against Arnold's theory of origin for these tumors.

Although the lining of the sinus was injected and thickened and there was some fluid present in which shining particles were seen, probably cholesterin, there was no evidence of infection and so the wound was closed. A probe was first passed downward through the osteum into the nose, showing it to be patulous. A small rubber tube drain was inserted at the outer angle and removed the following day. Operation time, fifty minutes.

The healing was immediate and patient left hospital October 18. Seen last, December 21, wound healed, no disfiguration, perfectly free from all symptoms.

Histologic Examination.—Dr. Ohpul's report: Sections show spicules of bone between which the narrow space is filled with fibrous and fatty tissue. The tumor is irregular in form, 2 cm. by 2 cm. by 1.5 cm.; weight, 47 grains.

Diagnosis.—Osteoma of frontal sinus.

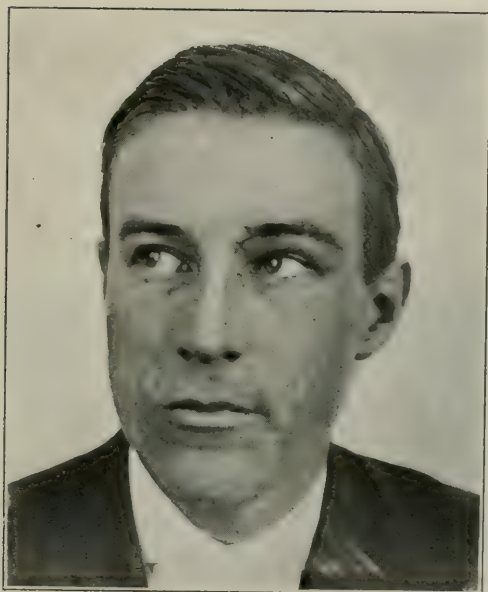
This tumor may have been a dead osteoma free in the sinus or, as remarked, it may have been attached to the anterior wall. In any case, there was no contiguity with the ethmoid region and so controverts Arnold's theory of etiology.

It is the first case, as far as I know, where a diagnosis has been made of such a tumor where there have been no external bony changes to indicate its presence.

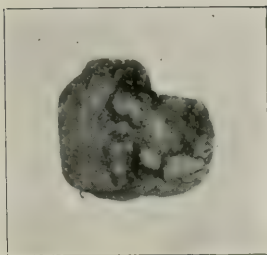
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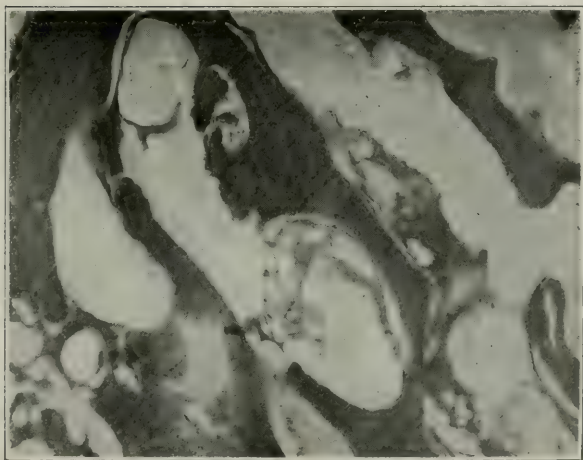
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Photograph taken shortly after operation.



Photograph of tumor. Actual size.



Section of tumor.

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XXIII.

THIRD YEAR OBSERVATIONS OF CLINICAL OZENA AND ITS VACCINE TREATMENT.

BY

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SAN FRANCISCO.

INTRODUCTION.

In the past year our investigations relative to fetid ozena have been chiefly clinical. Our work has been considerably enhanced by virtue of the prize award of the Pacific Coast Oto-Ophthalmological Society, whereby we were enabled to procure suitable cageings for the animals used in these studies. We have enjoyed, also, the cooperation of many rhinologists throughout the country, and take this means of thanking them for the submission of material for bacteriologic study, for clinical data of cases under observation, and for many valuable suggestions pertaining to our work. In order to acquire a broader expression of the clinical aspects of atrophic rhinitis, and to determine what general value has been attained through vaccine therapy in this condition, a comprehensive questionnaire has been submitted to all interested in this subject.

In our previous bacteriologic studies we were impressed by the striking resemblance of the coccobacillus fetidus ozenæ of Perez to *B. bronchosepticus*, the specific organism of canine distemper. To facilitate the bacteriologic nomenclature we had deemed it advisable to group the coccobacillus of Perez with *B. bronchosepticus*, and proposed its designation as *B. rhinosepticus* as a more fitting appellation. This change in name we have followed in our recent contributions upon this subject.

It was our purpose to limit our investigations along certain specific lines and to determine:

(1) The existence of different types of ozena upon a bacteriologic basis, and to establish the relationship of atrophic rhinitis to accessory sinus disease.

(2) The clinical relationship of *B. rhinosepticus* and the *B. Friedlander* group to ozena.

(3) The value of specific vaccine therapy in the various types of atrophic rhinitis.

We have tabulated these results, and note a considerable degree of similarity in expressions of the **clinical aspects of** ozena as well as results attained through vaccine administration. The brevity of questionnaire answers cannot fully allow individual expression, and we are therefore incorporating in this report such personal communications as are pertinent and more illuminating to the subject in hand.

CLINICAL DIFFERENTIATION OF TYPES.

It is apparent that the inclination to group all the types of atrophic rhinitis with crusting and odor as fetid ozena, and to consider them from the same etiologic viewpoint, or apply to them the same therapeutic measures, is obviously incorrect. In our previous communication on this subject we laid stress upon accessory sinus involvement as complicating fetid atrophic rhinitis, and presented such bacteriologic studies to demonstrate the constant presence of *B. rhinosepticus* or some type of the *B. mucosus capsulatus* group in all cases of fetid atrophic rhinitis. We are convinced that in these cases the accessory sinuses are too frequently disregarded, and that turbinal atrophy is at times a secondary process. Mechanical intranasal distortion, allowing accumulation and organization of secretions, might create a favorable environment for bacterial lodgment, especially for the *Friedlander* organisms. Permanent escape of the accessory sinuses from infection from a chronically infected contiguous membrane seems hardly possible. In more than fifty per cent of cases of fetid atrophic rhinitis under study was there definite accessory sinus involvement, especially of the sphenoidal and ethmoidal cells. Whatever the nasal pathology may be, its importance seems distinctly subordinate to the condition of the contributal nasal chambers, and demands a different consideration from fetid atrophic rhinitis simplex.

Whilst a certain conflict of bacterial entities, namely, *B. rhinosepticus* and the Friedlander group organisms, still prevails in culture findings, the constant presence of one of these types in all cases of true atrophic rhinitis (fetidus) lends encouragement to the establishment of a bacterial cause.

There is still a third group, presenting some odor, a thickened dirty mucoid secretion rather than crusting, and turbinate hypertrophy rather than atrophy. Sinus involvement may or may not coexist. The organism *rhinosepticus* is never recovered from these cases, although the Friedlander bacillus is not infrequently isolated in luxuriance. There appears to be neither clinical nor bacteriologic foundation for grouping such cases with fetid atrophic rhinitides.

CLINICAL RELATIONSHIP OF *B. RHINOSEPTICUS* AND
B. FRIEDLANDER GROUP TO OZENA.

In our previous communication on this subject we were inclined to ascribe, from the bacteriologic viewpoint, to *B. rhinosepticus* the sole etiologic rôle in clinical ozena. *B. Friedlander* was looked upon as a secondary invader. Although the coisolation of *B. rhinosepticus* was noted in a few instances of Friedlander cases, the latter organism seemed destined to dominate the entire bacterial stage—an end-reaction of immutual symbiosis. There have arisen as yet no impressions to indicate a recession from such assumption. The final solution of this problem, however, must rest upon bacteriologic experimentation. These have not as yet been sufficiently advanced to warrant definite conclusions.

Certain clinical results, also, tend to emphasize the etiologic importance of *B. rhinosepticus*, in that improvement usually occurs in cases of fetid ozena from which both organisms are isolated, under *rhinosepticus* vaccine treatment, but no results have ever been obtained with even an autogenous Friedlander vaccine. Even frank Friedlander infection cases at times respond gratifyingly to *rhinosepticus* vaccine, although the marked failures and most discouraging results have always been in cases of seemingly pure *B. Friedlander* infection with extensive accessory sinus disease. Again, in a considerable number of instances, initially giving plate colonies of *B. Friedlander* and absence of *B. rhinosepticus*, the *rhinosepticus* or-

ganism was isolated after several injections of this vaccine. We offer in explanation of this occurrence the theory of focal activation of a deeper or higher seat of infection.

Reference has been made to the common existence of Friedlander bacilli in rhinitis when associated with accessory sinus involvement. This organism often appears to persist in pure culture under such conditions. We are, though, mindful of the probable prior sinus invasion by rhinosepticus, or that secretions are mechanically arrested through atrophy and enlargement of the nasal chambers, creating an ultimate Friedlander habitat.

Persistent absence of *B. rhinosepticus* findings in nonfetid atrophic rhinitis, chronic hypertrophic rhinitis, sinusitis without odor and normal individuals, is one of the strongest arguments presenting itself in determining the etiologic relationship of this organism. In the past year a consistent endeavor has been made in determining, from a clinical standpoint, whether or not this organism might be but a simple saprophytic entity. Bacteriologic findings have been uniformly negative. Of interest also is the paucity of bacteria noted in nonfetid nasal affections and in the nasal cavities of normal individuals.

We have as yet pursued no definite lines of investigation in determining the modus and means of infection. We are, though, inclined to support the original contention of Perez, in that the disease is acquired from dogs. This hypothesis is apparently negated in the clinical charts herewith presented; nevertheless, we feel that the question of animal pets has been too closely answered in that through the general domestication of the dog a much more liberal contact has been indulged in. An interesting case in point of contact and possible bacterial communication has come to our attention. A mother and child presented themselves with definite clinical ozena. On interrogation it was found that a pet dog was afflicted with a chronic nasal catarrh, which condition preceded that of the humans. Bacteriologic examinations revealed a *B. rhinosepticus* infection in the mother and child, and a *B. bronchosepticus* infection in the dog—apparently a distemper carrier. We are as yet compelled to reserve comment upon these findings.

We do not find the isolation of *B. rhinosepticus* encumbered

with any difficulties, and are becoming more and more rigid in our demand for the demonstration of this organism in sustaining the diagnosis of true ozena. During the year, three hundred and forty-three specimens were submitted for bacteriologic study. These cases embrace the entire gamut of intrarhinal pathology as well as a certain group of individuals with normal nasal mucous membranes. Of this number the cultures from one hundred and twenty-six cases showed *B. rhinosepticus*—all clinically true ozenas—and seventy-six cases, a portion of which were apparently true ozena, gave exclusive *B. Friedlander* cultures. Of twenty-two of the *B. rhinosepticus* culture cases were cultures mixed with *B. Friedlander*. *B. pyocyaneus* was present in four instances. The presence of this organism makes the isolation of other organisms difficult and often impossible. One hundred and thirty-seven cases were negative to either *B. rhinosepticus* or *B. Friedlander*, and were often sterile.

TABLE I.

BACTERIOLOGIC SUMMARY OF NASAL SECRETIONS EXAMINED DURING THE PAST YEAR, INCLUDING CASES OF TRUE ATROPHIC RHINITIS, NONATROPHIC RHINITIS, AND NORMAL INDIVIDUALS.

B. Rhinosepticus:

Alone	104
With <i>B. Friedlander</i>	22
	—
Total	126

B. Friedlander:

Alone	76
With <i>rhinosepticus</i>	22
	—
Total	98

<i>B. pyocyaneus</i>	4
Negative to <i>B. rhinosepticus</i> , or <i>B. Friedlander</i> , or sterile cases.....	137
	—

Total343

VACCINE THERAPY.

We deem it a far cry to attempt to establish the etiologic relationship of a microorganism to a certain disease through clinical results obtained by injections of suspensions of the killed organism in question. The fundamental purport of our investigation has been one of etiology. On the other hand, whilst appreciating the caution necessary in attempting to establish the causal relationship of a certain microorganism to a definite morbid process, we have inclined to vaccine therapy in the hope of finding some more potent weapon of combat against this obnoxious disease, to strengthen our heretofore limited and unpromising measures of relief.

Whether or not the rhinosepticus vaccine is specific, or through the parenteral digestion of a foreign protein the colloidal dispersion renders a mobilization of ferments, thereby elevating the titre of infection resistance, is a moot point in biology still to be determined. We are dealing with a focal infection, distinctly insidious and chronic. Intravenous vaccine injections have produced a transient leucocytosis and constitutional reaction, without in any way influencing the intranasal conditions. Subcutaneous injections have, on the contrary, afforded us promise of amelioration of the manifestations of a heretofore hopeless condition. Clinical improvement is the common response. Clinical cures have been rare in that relapse after discontinuance of treatment is not infrequent. Bacteriologic cures, except in one or two instances, have never been obtained. Ample drainage in conjunction with vaccine administration appears to be the most fruitful method of treatment, where there is accessory sinus involvement.

Incident to a scattered and dissociated therapeutic investigation, and with an aim at uniformity, a certain empiricism must of necessity obtain. In supplying a vaccine quite generally throughout the country for the treatment of ozena, we have prescribed such outlines of administration, in reference to dosage and injection interim, as were suggested by our own experience. We have advised as an initial injection about 200,000,000 killed organisms, increasing this and subsequent doses by 200,000,000 every fourth day. Such dose first preceding that inductive of constitutional reaction is termed the

dose of tolerance. This usually occurs between the administration of the 600,000,000 to 1,000,000,000 dose. The interim of injection is now lengthened to seven days and the doses increased about 250,000,000.

In the main, the treatment of our own cases has followed this outline. We have found it necessary, though, to exercise a considerable watchfulness of the patients' individual variation in regard to idiosyncrasy, susceptibility and toleration. Some patients seem unable to tolerate small doses of vaccine, but after a persistent endeavor take relatively large doses without discomfort. Some show no improvement through this method of therapy until excessively large doses are reached, whilst we have noted an occasional patient respond clinically only to small doses and with marked and discomforting nasal manifestations on large doses. In other words, it is our impression that the vaccine treatment of ozena parallels that of most other insidious and relatively benign infections. We have not as yet a suitable measure or index of immologic response other than our clinical sense. The vaccine therapy of ozena is encumbered, and the negative results encountered, like unto the chronic infections in general.

ABSTRACT OF CASE REPORTS.

The response to a questionnaire submitted by us to those having used the vaccine prepared by us during the past year were on the whole very satisfactory. About thirty-five records were filled out with sufficient detail upon which reliable conclusions could be based.

It would appear from these answers that ozena is a widespread disease, prevalent in all parts of the United States, afflicting rich and poor, children and the middle aged, those in urban and rural communities, and showing no choice or disregard to occupation and vocation. Nor does it appear that the disease has a predilection for those living in a questionable hygienic environment.

From various sources we gather the impression that many cases of ozena have been neglected owing to unpromising measures for relief at disposal, and that the ozena patient was rather

looked upon as an unwelcome visitor. Latterly there appears to be a distinct revival of interest in this subject, as well as a keener appreciation of the importance of associant accessory sinus involvement. Liberally discounting our own zeal in advancing a vaccine for the treatment of these cases and the general enthusiasm engendered by any new therapeutic measure, it nevertheless appears that the results of treatment by means of vaccine have been on the whole satisfactory and in some instances brilliant.

A general survey of the clinical comments of other observers and their vaccine results check remarkably well with our own experience. Clinical cures have been claimed with reservation and many relapses have been noted. In Table II are shown the end-results of vaccine treatment of cases reported by us in our previous communication. We have had opportunity of studying twenty-six additional cases, and these are charted in Table III. In Table IV are shown the reports of clinical aspects of ozena as noted by other observers, with comments on vaccine therapy.

Briefly summarizing the salient features of clinical ozena, we may conclude as follows:

FAMILY HISTORY.—There is an apparent negation to the claim of the frequent infection of other members of the same family.

INFECTION FROM ANIMALS.—As charted, it appears that the possibility of infection from lower animals, especially dogs, is decidedly remote. We feel, however, that too strict an interpretation of animal contact and animal pets has been indulged in that the domestication of the dog is a most common custom in this country. We feel that, upon a bacteriologic basis at any rate, the original contention of Perez will ultimately be proven to be the truth.

ODOR DETECTED BY PATIENTS.—The previously held belief that patients with ozena of long standing ultimately lose the ability of detecting their own odor is apparently incorrect.

CHARACTERISTIC ODOR.—The odor from the ozena patient is so variously described that it appears impossible to correctly qualify it. We have at times been inclined to note an odor as "not characteristic" and be supported by negative bacteriologic findings. On the other hand, the organism of Perez

has been isolated when no odor whatsoever existed. The inclination is to ascribe the odor, both in character and degree, to the extent of atrophy and possibilities of drainage, rather than to the products of the activities of the causal micro-organism.

CHARACTERISTIC CRUSTS.—There are no characteristic crusts in ozena. The type depends upon the age, extent of the process, and the mechanics of the intranasal condition. In the very old, highly atrophic cases, the flaky white crusts simply represent the normal condition for a given amount of atrophy.

ATROPHY.—In old cases atrophy is almost invariably bilateral. We have, however, every reason to believe that a unilateral ozena can exist.

ACCESSORY SINUSES.—In eighty-five per cent of our cases was involvement of the accessory sinus more than probable. This point has been discussed elsewhere in this paper. We think it highly probable that in every case the sinuses are invaded by the offending organism, and no form of treatment can be considered which does not give proper weight to this fact. The frontals, because of the difficulty of examination, we know nothing about; the other sinuses seem about equally involved.

CLINICAL PROBABILITIES BEFORE BACTERIOLOGIC EXAMINATION.—It would seem that there is a certain clinical complex characteristic of bacillus rhinosepticus ozena. In our twenty-six cases, judged before the bacteriologic study, only three mistakes were made as to the true bacteriologic nature of the complaint. This would seem to indicate that the ozena due to bacillus rhinosepticus and Friedlander group are clinical entities, and should be classed as such in contradistinction to marked atrophic rhinitis with odor and crusts due to syphilis, tuberculosis, and other constitutional diseases.

VACCINE INJECTION.—The average number of injections used ranges around fifteen. The improvement was usually noted by the fourth injection, and continued up to the twelfth or fifteenth. From then on it seems to settle itself down into a long process of supplying the patient with enough antibodies to keep the disease well under control, and in some cases can be continued indefinitely with good results.

CHARACTER OF REACTION.—With proper vaccines, given in proper doses, the reaction is never severe. Marked symptoms are to be avoided. The best results are obtained where one remains just under the reaction point. The seven day interval, after the proper dose has been reached, seems to be the most convenient and most useful.

RESULTS.—Although our main interest in the study of ozena during the last three years has been largely confined to the question of etiology and clinical pathology, general interest seems to be in the results. The beneficial result of vaccine treatment was marked in the great majority of cases. End results or the permanency of clinical cure have been difficult to establish, owing to the fact that certain cases were lost from observation when crusting and odor disappeared. Thus in twenty-three cases treated in Chart II of our last year's report, thirteen noted as clinical cures did not return for treatment.

SUMMARY OF 1916 RESULTS, STILL UNDER OBSERVATION.—Case 1, the priest, who was obliged to douche his nose every few hours in order to carry on his confessional work, has had no return of symptoms as far as crusting and headaches, but from time to time notices a slight odor, easily controlled by an occasional douche.

Case 2 remains a clinical cure, without crusts and odor, and never has to douche the nose. The *B. rhinosepticus* can always be demonstrated.

Case 3, one of the most evil smelling of this series, remains clinically cured without any local treatment. This person could not be admitted to the reception room on account of the foulness of odor.

Cases 10, 11 and 12, mother and two children, remain about the same. The treatment has been almost continuous throughout the year. Because of positive complement fixation test for tuberculosis, it is possible we are dealing with a latent tuberculosis, which may account for the poor results.

Case 14, a young woman whose engagement was broken on account of the odor, has remained a remarkable clinical but not a bacteriologic cure. The girl married her former affianced and considers herself cured.

Case 21, Sister P., three years under treatment for pansinusitis, remains clinically but not bacteriologically cured. She has had no vaccine treatment for the past year.

Case 22, dentist, who was obliged to limit his practice on account of the odor, remains a permanent clinical cure. He has had one or two short vaccine treatments throughout the year, and still gives a positive *B. rhinosepticus*.

Thus it will be seen that every case in Chart II reported as clinical cures have remained so, a very satisfactory record. The constant presence of the *B. rhinosepticus* shows that these cures are not permanent, but that antibodies must be supplied indefinitely in the form of small doses of vaccines, repeated at intervals, for an indeterminate period.

Chart III contained nine cases, eight Friedlander ozena, treated with our vaccine. Seven of the nine noted as clinical cures did not return for further treatment. The other two have remained entirely well without vaccine or local treatment during the year. The Friedlander is still present in cultures.

ANALYSIS OF RESULTS OF NEW CASES TREATED SINCE LAST REPORT.—Twenty-six cases are reported in our new series (Table III). Six were untreated. Five did not improve. Six cases were improved as the results of operative drainage on the sinuses, and no credit was given to the vaccine. In the nine remaining cases great improvement or clinical cures are noted.

Of the five cases showing no improvement, only one was a true *B. rhinosepticus* ozena. This case received but three injections and did not return.

The remaining nine cases form a happy paragraph in the therapy of this disease. The improvement was marked, in some cases very striking, the crusts and odor rapidly disappeared. The frontal headaches invariably cleared up after the third or fourth injection. Weight and general condition improved. These and the last year's series have been carefully and fairly studied. We see no reason to change our conclusion of last year (No. 5), that "at present mixed vaccines made from various strains of the Perez bacillus (*B. rhinosepticus*) is the most practical method of treatment which is now available."

No.	P.O. No.	Name	Age	Sex	Nationality	Referred By	Clinical Diagnosis	Bacteriologic Findings	Agglutination	Number Injec.	Crusts	Odor	Results, 1916	Results, 1917
1	1	Adolphus....	28	M.	German....	Dr. Vectors..	Ozena....	Perez....	+	20	.....	.....	No crusts, no odor. Clinical cure. Under treatment....	No vaccine treatment for months. No crusts. Slight odor at times, easily controlled by salt water douch. Sinuses not investigated. Clinical cure.
2	2	Alpert.....	22	M.	Russian Jew.	Dr. Richards.	Ozena....	Perez....	+	10	.....	.....	No crusts, no odor. Clinical cure....	Results very unsatisfactory, constant treatment during year. Odor decidedly improved, but still marked at times. No local treatment.
3	10	Miranda, Mrs	37	F.	Spanish....	Poly.....	Ozena....	Perez....	+	9	.....	.....	No crusts, no odor. Under treatment....	Result very unsatisfactory, constant treatment during year. Odor decidedly improved, but still marked at times. No local treatment.
4	11	Miranda, J....	11	M.	Spanish....	Poly.....	Ozena....	Perez....	.....	9	.....	.....	No crusts, no odor. Under treatment....	Results very unsatisfactory, constant treatment during year. Odor decidedly improved, but still marked at times. No local treatment.
5	12	Miranda, H..	12	M.	Spanish....	Poly.....	Ozena....	Perez....	.....	9	.....	.....	No crusts, no odor. Under treatment....	Results very unsatisfactory, constant treatment during year. Odor decidedly improved, but still marked at times. No local treatment.
6	14	Plant.....	20	F.	American....	Office.....	Ozena....	Perez....	+	19	.....	.....	No crusts, no odor. Clinical cure....	Remains clinical cure. See detailed report in body paper.
7	20	Spunner....	35	M.	American....	Office.....	Atr. rhin....	Perez....	-	5	0	.....	Ozena larynx. Great improvement....	Remains clinical cure. See detailed report in body paper.
8	21	Prescella....	22	F.	German....	Office.....	Pansinitis..	Perez....	-	19	+	.....	No crusts, no odor. Clinical cure....	Remains clinical cure. See detailed report in body paper.
9	22	Weber.....	27	M.	American....	Office.....	Ozena....	Perez....	+	14	+	.....	No crusts, no odor. Clinical cure....	Remains clinical cure. See detailed report in body paper.
10	8	Kelleher....	17	F.	German....	Dr. Vectors..	Ozena....	Perez....	+	20	+	.....	No crusts, no odor. Clinical cure. Under treatment....	Persisting slight odor. No crusts as long as occasional vaccine.

TABLE III

CLINICAL SUMMARY OF OZENA CASES OBSERVED BY US SINCE LAST REPORT, WITH COMMENT ON EFFECT OF RHINOSEPTICUS VACCINE

No.	Initials	Age	Sex	Social Condition	Nationality	Occupation	Service	Duration	Other Members	Played with Dogs	Change in Odor	Patient Detects Odor	Character of Odor	Character of Crusts	Atrophy	Accessory Sinuses	Clinical Probabilities Before Bacterial Examination
1	M. J.	30	F.	S.	American	Housewife	U. of C.	Childhood	No	No	Some	No	Slight	Slight, whitish	Marked, bilat.	Ethmoids ?	Not B. rhinosepticus ozena.
2	A. S.	16	F.	S.	Italian	Schoolgirl	U. of C.	Childhood	No	No	Some	Yes	Slight, not characteristic	Blackish	Marked, bilat.	Ethmoids ?	Not B. rhinosepticus ozena.
3	J. P.	22	M.	S.	Spanish	Student	U. of C.	Childhood	No	No	Some	No	None	Whitish	Marked, bilat.	Ethmoids rt ?	Not typical true ozena.
4	A. M.	68	M.	M.	Norwegian		U. of C.	Several years discharge	No	No	Some	Yes	Not characteristic, strong	Whitish	Marked, bilat.	Ant. lat.	Not true typical ozena.
5	C. E.	58	F.	M.	German	Housewife	U. of C.	Many years	No		Some	No	Foul, characteristic	Blackish	Marked, bilat.	Ethmoids	Typical of true B. rhin. ozena.
6	R. B.	37	F.		Jewish	Housewife	U. of C.	Many years	No		Some		Very bad	Har, black	Medium, bilat.	Ethmoids	Not typical of true B. rhin. ozena.
7	F. D.	34	M.	M.	Bulgarian		U. of C.	Many years	No		None	No	None	None	Marked, bilat.	None	Not typical of true B. rhin. ozena.
8	R. P.	15	F.	S.	American	Schoolgirl	U. of C.	Many years	No		None	Yes	Slight, not characteristic	Blackish	Slight, bilat.	L. antrum	Not typical of true B. rhin. ozena.
9	E. L.	46	M.	M.	American		Polyclinic	Many years	No		None	No	Very slight	Slight	Marked, bilat.	Probable	Not typical of true B. rhin. ozena.
10	J. S.	55	M.	M.	American	Business	Private	30 years	No		Getting worse	No	Marked, characteristic	Greenish	Marked, bilat.	Sphenoids, antra.	Typical true ozena
11	E. H.	35	F.	M.	American	Housewife	Private	Several years	No		Getting worse	Yes	No	Slight	Marked, bilat.	L. antrum	Not typical true ozena.
12	H. I.	23	M.	S.	Japanese	Servant	Private	5 years	No		Getting worse	Yes	Foul, typical	Large, greenish	Marked, bilat.	None ?	Typical true ozena

13	H. F.	55	F.	M.	American...	Housewife.	Private...	15 years...	No	Getting worse...	No	Yes	None.	None.	Marked, bilat.	Typical old ozena process self limited.
14	A. B.		M.		American...		Private.	Several years.	No	Getting worse...	No	Yes	Foul, typical.	Whitish.		Typical old ozena process self limited.
15	G. O.	16	M.	S.	American...	Schoolboy.	Private.	Several years.	Yes	Yes Getting worse...	Yes	Yes	Foul, typical.	Typical ozena.	Marked, bilat.	Typical ozena.
16	R. S.	26	F.	S.	American...	Teacher.	Private.	Childhood.	Yes	No Getting worse...	Yes	Yes	Slight, not typical.	Light, whitish.	Marked, bilat.	Not typical of true ozena.
17	E. B.	30	F.	S.	American...		Private.	Childhood.	No	No Some...	No	No	Slight.	Slight.	Marked, bilat.	Typical old ozena.
18	S. H.	30	F.	S.	German.	Teacher.	Private.	Childhood.	No	No Some...	No	Yes	Slight, typical.	Slight, whitish.	Marked, bilat.	Typical old ozena.
19	A. R.	22	F.	S.	American...		Private.	Childhood.	No	No Some...	No	Yes	Marked, typical.	Thick, greenish.	Marked, bilat.	Typical old ozena.
20	W. M.	50	M.	M.	American...	Machinist.	Private.	Childhood.	No	No Some...	No	Yes	Foul, typical.	Thick, greenish.	Marked, bilat.	Typical old ozena.
21	G. B.	18	F.	S.	Italian...	Stenog'r.	Private.	Childhood.	No	Getting worse...	No	Yes	Foul, not typical.	Thick, whitish.	Marked, bilat.	Not typical of ozena.
22	K. B.	30	F.	M.	Italian...	Housewife.	Private.	Childhood.	No	Getting worse...	No	Yes	None.	Thin, whitish.	Marked, bilat.	Not typical of ozena.
23	L. W.	42	F.	M.	American...	Housewife.	Private.	Childhood.	No	Getting worse...	No	Yes	Foul, not typical.	Thick, black.	Marked, bilat.	Not typical of ozena.
24	E. D.	20	F.	S.	American...	Schoolgirl.	Private.	Years.	No	Getting worse...	No	Yes	Foul, not typical.	Thick, black.	Marked, bilat.	True ozena.
25	M. L.	26	F.	S.	American...	Clerk.	Private.	Years.	No	Getting worse...	No	Yes	Foul, not typical.	Thin, whitish.	Marked, bilat.	True ozena.
26	L. D.	27	M.	S.	American...	Clerk.	Private.	Years.	No	Getting worse...	No	Yes	Foul, not typical.	Thick, whitish.	Marked, bilat.	True ozena.

TABLE III—Continued

CLINICAL SUMMARY OF OZENA CASES OBSERVED BY US SINCE LAST REPORT, WITH COMMENT ON EFFECT OF RHINOSEPTICUS VACCINE

No.	Bacterial Examination	Clinical Diagnosis	Date First Injection	Date Last Injection	Total No. Injec	Character of Reaction	Disposition of Case	Results	Patient's Statement	Result Last Bac. Exam.	Remarks
1	B. rhin. negative.	Atr. rhin., non-fet. not true ozena.	10/2/16	3/6/17	9	Insomnia, marked local.	Under treatment	No marked result.	Sleep better, headache better.		
2	B. rhin. negative. B. Friedlander.	Not true ozena.	1/30/16	3/20/17	4	Marked local.	Under treatment.	No marked result.	No improvement.		
3	B. rhin. present.	True ozena.	3/5/17	3/13/17	3	Marked local.	Under treatment.	No marked result.	No improvement.		
4	B. mucosus.	Atr. rhin., non-fet. (access. sin.)	10/2/16	3/16/17	13	Marked local and general.	Under treatment.	Entirely cured, vaccines only partly responsible.	General condition very much improved.		
5	B. rhin. present. B. Friedlander.	True ozena.					Under treatment.	Vaccine treatment not begun.			
6	B. of Abels.	At. rhin. fet.					Under treatment.	Vaccine treatment not begun.			
7	B. rhin. negative. B. rhin. negative. Staphy. pyoaur.	Atroph. rhin.					Under treatment.	Vaccine treatment not begun.			
8	B. Friedlander.	Atroph. rhin. (access. sin.)					Under treatment.	Vaccine treatment not begun.			
9	Staphy. pyo. aur. eus.	Atroph. rhin. (access. sin.)	10/24/17	3/29/17	5	Slight.	Discharged.	No results from vaccine.	No improvement.		
10	B. rhinosepticus.	True ozena.	7/15/17	9/15/17	9	Slight.	Discharged.	Clinical and bacteriological cure.	Vast improvement	B. rhin. no longer present.	
11	B. rhinosepticus.	True ozena.	1/16/17	1/15/17	6	Slight.	Discharged.	Complete cure of crusts due to operation on antrum.	Cured.	B. rhin. still present.	
12	B. rhinosepticus.	True ozena.	2/13/17	2/22/17	7	Slight.	Under treatment.	Marked improvement, no odor, no crusts.	Marked improvement.	B. rhin. still present.	

TABLE IV

CLINICAL SUMMARY OF OZENA CASES BY OTHER OBSERVERS WITH COMMENT ON RESULTS OBTAINED UNDER B. RHINOSEPTICUS VACCINE TREATMENT

No. Initials	Age	Sex	Social Condition	Nationality	Occupation	Service of Dr.	Duration	Other Members Same Family	Played with Dogs	Changes in Odor	Patient Detects Odor	Character of Odor	Character of Crusts	Atrophy	Accessory Sinuses	Bacterial Examination
1 E. V.	18	M.	S.	Mexican...	Waiter...	C. E. Ide, Los Angeles, Cal.	Childhood...	No	No	Increased...	Yes	Strong, characteristic	Dry, thin, whitish...	Slight, swollen...	Not evident...	B. rhinosepticus
2 M. E.	13	F.	S.	American...	Schoolgirl...	P. A. Jordan, San Jose, Cal.	Babyhood...			Increased...	No	Weak...	Greenish...	Medium bilat...	Yes ?	B. rhinosepticus
3 B. B.	18	F.	S.	American...	Student...	Geo. C. Albright, Iowa City, Iowa	Childhood...	No	Some	Increased...	Yes	Strong, heavy, foetid, Always characteristic	Greenish, dry, hard...	Slight bilat...	Both antra & ethmoids...	B. rhinosepticus
4 A. C.	21	M.	S.	Am. negro	Teacher...	W. T. Patton, New Orleans, La.	6 years...	No	No	Increased...	Yes	Weak...	Greenish yellow	Slight unilat...	Ethmoids...	B. rhinosepticus
5 J. T.	25	M.	S.	American...	Salesman...	W. T. Patton, New Orleans, La.	10 years...	No	No	Diminished	No	Weak...	Moist greenish yellow...	Slight bilat...	No...	B. rhinosepticus
6 A. W.	22	F.	S.	American...	Housewife...	W. T. Patton, New Orleans, La.	5 years...	No	No	Increased...	No	Weak, characteristic	Dry greenish yellow...	Slight bilat...	No ?	B. rhinosepticus
7 C. H. T.	24	F.	M.	American...	Clerk...	F. W. Bassett, Los Angeles, Cal.	10 years...	No	No	Diminished	No	At first strong, now none	Hard, dark...	Slight unilat...	Ethmoids R.	B. rhinosepticus
8 T. W.	59	M.	M.	Jewish...	Manufacturer...	W. T. Patton, New Orleans, La.	40 years...	No		Slight, diminished	No	Weak, characteristic	Dry, green...	Extreme bilat...	No...	B. Friedlander, B. rhinosepticus
9 L. B.	27	F.	S.		Nurse...	C. E. Ide, Los Angeles, Cal.	Childhood...	No	No	Remains same...	Yes	Musty, foul...	Dry, yellowish green, profuse	Extreme bilat...	?	
10 L. S.	35	F.	S.	American...	Teacher...	F. C. Harvey, Spokane, Wash.	Childhood...	No	No	Remains same...	Yes	Strong, but varies...	Greenish...	Moderate bilat...	Yes...	
11 A. M. A.	18	M.	S.	Irish...	Student...	G. Ainslee, Portland, Or.	Childhood...	No	No	Cannot tell	No	Weak, characteristic	Thick, green...	High grade bilat	Yes ?	None...
12 A. C.	43	M.	M.		Restaurant...	C. T. Chamberlin, Portland, Or.	10 years...	No	No	Same...	No	Weak...	Thick, green...	Bilateral...	Yes...	
13 E. B.		F.	M.	American...	Bookkeeper...	D. H. Trowbridge, Fresno, Cal.	16 years...	No	Yes	Diminished	Yes	Strong...		High grade bilat	None...	
14 W. G.	11	M.	S.	American...	Schoolboy...	Dunbar Roy, Atlanta, Ga.	7 Years...	No		Increased...	No	Strong...	Dry...	High grade bilat	None...	None...
15 L. M.	24	M.	S.	American...	Med. stud...	G. M. Coates, Philadelphia, Pa.	Childhood...	No		Increased...	No	Very foul, characteristic	Very large, green moist	High grade bilat	Yes...	None...
16 G. K.	18	M.	S.	American...	Garage...	J. W. Calkins, Oakland, Cal.	Years...	No	?	Diminished	No	None...	Dark...	Moderate bilat...	Mod. bilat...	Rod shaped B.

17	B.F.	11	F.	S.	American...	Schoolgirl...	A. E. Owen, Lansing, Mich.	7 years...	No	Diminished	No	Strong, characteristic.	Moist, greenish	Marked bilat.	Yes	
18	L.P.	35	M.	S.	...	Elevator operator...	W. E. Waddell, Los Angeles, Cal.	Several years.	No	Increased...	Yes	Characteristic.	Heavy, greenish	Medium bilat.	Ehroids.	Mixed pus.
19	R.H.	10	F.	S.	American...	Schoolgirl...	W. E. Waddell, Los Angeles, Cal.	2 years.	Fat & Sis	Increased...	Yes	Weak, characteristic.	Heavy, greenish	Medium bilat.	None.	Mixed pus.
20	H.B.	27	F.	S.	American...	Nurse...	C. E. Ide, Los Angeles, Cal.	Childhood	No	Same...	Yes	Strong, musty.	Profuse, yellow green.	Extreme bilat.	?	Friedlander...
21	E.G.	18	M.	S.	American...	Student...	P. A. Jordan, San Jose, Cal.	Childhood	No	Same...	No	Strong.	Green dark.	Medium bilat.	Ehroids.	B. rhinosepticus negative.
22	L.B.	22	F.	S.	Cuban...	Business.	E. F. Soto, Havana, Cuba...	4 years.	No	Same...	Yes	Weak.	Green dark.	Medium bilat.	No.	
23	G.C.	35	M.	M.	American...	Thsmith.	G. L. Richards, Fall River	Many years.	No	Same...	Yes	Weak.	Few.	Marked unilat.	No.	Coarse stout bac. staph. & staph (1916)
24	C.K.	14	M.	S.	American...	Newsboy.	F. Maxey, Boise, Idaho	Several years.	No	Increased...	Yes	Moderate, characteristic.	Dirty yellow.	Moderate bilat.	Ehroids.	
25	L.H.	20	F.	S.	American...	None.	H. Allen, Portland, Ore.	15 years	No	Diminished	No	Weak.	Moderate gray.	Advanced bilat.	Ehroids.	B. rhinosepticus
26	B.W.	12	M.	S.	American...	Schoolboy.	C. H. Brooks, Santa Ana, Cal.	11 years.	No	Diminished	No	Characteristic.	Complete blocking of nose, greenish.	Bilateral.	Yes.	B. rhinosepticus
27	J.W.	24	F.	S.	American...	Clerk.	E. Israel, Houston, Tex.	Childhood	Ent. fam. 6 ch. & M.	Increased...	Yes	Strong, characteristic.	Heavy, green.	Marked bilat.	Yes.	B. rhinosepticus
28	M.M.	20	F.	M.	American...	Stenogr.	E. Israel, Houston, Tex.	1 year.	No	Increased...	Yes	Characteristic.	Greenish.	Mild bilat.	Painuitis.	B. rhinosepticus
29	E.B.	35	F.	S.	American...	Stenogr.	E. Israel, Houston, Tex.	2 years.	No	Increased...	No	Weak, alkaline.	Greenish brown	No atrophy.	Yes.	B. rhinosepticus
30	B.	14	F.	S.	American...	Schoolgirl.	D. Woods, San Diego, Cal.	3 years.	Sis.	Increased...	Yes	Very strong.	Thick creamy pus	Severe bilat.	Ehroids.	
31	M.S.	43	M.	M.	American...	Seamstress.	Dr. Wessels, San Diego, Cal.	20 years.	No	?	Yes	Characteristic, very strong.	Dry dark gray.	Bilateral.	Ehroids.	
32	B.	12	F.	S.	American...	Schoolgirl.	Dr. Wessels, San Diego, Cal.	5 years.	No	?	Yes	Strong.	Dark and hard.	Medium unilat.	?	
33	A.	18	F.	S.	American...	Schoolgirl.	Dr. Wessels, San Diego, Cal.	4 years.	No	Increased...	No	Weak, characteristic.	Small amount.	Small amount.	?	
34	L.	39	F.	M.	American...	...	Dr. Wessels, San Diego, Cal.	2 years.	No	No	No	None.	...	...	...
35	A.S.	16	M.	S.	American...	Schoolgirl.	F. E. Emerson, Boston, Mass.	8 years.	No	Diminished	Yes	None.	Small, thin, flakey.	Bilateral.	Negative.	B. mucosus cap.
36	H.D.	14	F.	S.	Italian...	Violinist.	F. E. Emerson, Boston, Mass.	2 years.	No	Remains same.	Yes	Moderate.	...	Mud. bilat.	Negative.	
37	J.J.	21	M.	S.	Italian...	...	F. E. Emerson, Boston, Mass.	8 years.	Bro.	Yes Increased...	Yes	Strong.	Greenish.	Marked unilat.	?	B. rhinosepticus
38	O.H.	20	F.	S.	American...	Laundry worker.	F. F. Cannon, Mart, Tex.	8 years.	3 oth.	Yes Better...	Yes	Strong, characteristic.	Grayish.	Bilateral.	?	
39	E.B.	...	F.	S.	American...	Bookkeeper	E. H. Trowbridge, Fresno, Cal.	15 years	No	Diminished	Yes	Strong.	...	Marked bilat.	...	B. rhinosepticus

TABLE IV.—Continued

CLINICAL SUMMARY OF OZENA CASES BY OTHER OBSERVERS WITH COMMENT ON RESULTS OBTAINED UNDER E. RHINOSEPTICUS VACCINE TREATMENT

No.	By Whom Made	Clinical Diagnosis	Date First Injection	Date Last Injection	Total Number	Make of Vaccine	Character of Reaction Following Max. Dose	Results—Quotations Attending Physicians	Condition at End of Treatment	Disposition of Case	Personal Communication by Letter
1	Bram, Zeiler, Hill.	Ozena	12/29/16	3/15/17	24	Bram, Zeiler, Hill.	Loss of appetite 1 bil.	Swelling reduced, breathing better.	Still slight scabbing and odor.	Still under treatment	Vaccine produces results unobtainable by other methods.
2	Horn & Victors.	Ozena	5/5/16	3/15/17	24	Horn & Victors	Slight rise temp.	Decided improvement, odor disappearing during time of treat.		Patient disappeared.	
3	Horn & Victors.	Ozena	2/5/16	3/6/17	8	Horn & Victors	Marked general and local	Not completed.		Still under treatment	Experience lim. to 3 cases very satisfactory.
4	Landford		1/3/17	3/2/17	14	P. D. & Co.	Mostly local.	Patient greatly improved, not entirely cured.		Still under treatment.	All cases improved markedly, cured from patient's standpoint.
5	Landford		2/1/17	3/15/17	17	P. D. & Co.	Mostly local	Greatly improved.		Still under treatment.	Experience lim. to 3 cases very satisfactory. All cases improved markedly, cured from patient's standpoint.
6	Landford		1/14/17	3/15/17	15	P. D. & Co.	Mostly local.	Greatly Improved.		Still under treatment.	Experience lim. to 3 cases very satisfactory. All cases improved markedly, cured from patient's standpoint.
7	Horn & Victors.	Atrophic rhin.	1/26/17	3/5/17	14	Horn & Victors.	Mostly local, in nose and larynx.	Marked improvement.		Still under treatment.	Experience lim. to 3 cases very satisfactory. All cases improved markedly, cured from patient's standpoint.
8	Landford	Ozena	1/25/17	3/15/17	6	Horn & Victors	Mostly local.	Greatly improved.	Patient so far better, does not want further treatment.		
9		Ozena	1/20/17	3/16/17	19			Less scabbing.	Nose feels better, less scabbing.	Still under treatment.	
10		At. rhin. acccs. sin. involvement.	10/29/16	3/19/17	12	Horn & Victors.	Violent chill.	No change.	Odor seems less.		Some doubt as to ding. Probable sinus trouble. Not a fair test. I believe atrophic condition is less marked.
11		Ozena	1/6/17	3/10/17	16	Horn & Victors.	Slight general.	Clinically cured.	Pat. clinically well, no crusts, no odor, m. m. looks better.	Still under treatment.	
12		Ozena	11/20/16	3/—/17	22	Horn & Victors.		Odor same, crusting reduced 2/3.		Still under treatment.	
13	Horn & Victors.		5/15/16					No change, inj. do not produce better results than ordinary treat.	Odor and scabs a little better.	Still under treatment.	Gets equally good results with Ag. No local.
14			2/6/17	2/13/17	10	Horn & Victors.		Greatly improved, no odor.	Small soft crusts but no odor.	Cured.	Certainly wonderfully improved, is not entirely cured. Subsequent relapse after long free from crusts.
15			12/27/16	2/23/17	8	Horn & Victors.	None.			Discharged.	Delighted with the results, hope improvement is permanent.
16	Calkins.		1/11/17	3/19/17	20	Horn & Victors	Local.	No odor, atrophy improving, crusts better.			

17	Owen.....	Ozena.....	1/13/17	3/17/17	15	Horn & Victors.	Marked local and gen.....	No odor, crusts less, atrophy decidedly less	No crusts, no odor....	Discharged.....	Am pleased with present nasal condition. Not as satisfactory a first case.
18	Simpson.....	Ozena.....	10/4/16	.....	12	Horn & Victors.	Slight local, no gen.....	No improvement.....	.....	.....	.....
19	Simpson.....	Ozena.....	7/8/16	2/27/17	14	Tuberculin.....	Marked local.....	Improvement not marked, but decidedly better.	.....	.....	.....
20	Horn & Victors.	Ozena.....	1/30/17	.....	10	Horn & Victors.	.....	Note increased moisture.	.....	.....	.....
21	Horn & Victors.	Ozena.....	12/10/16	3/10/17	15	Horn & Victors.	.....	No improvement.....	.....	.....	.....
22	.....	Ozena.....	2/16/17	3/19/17	11	Horn & Victors.	Local, mild.....	P. free from headaches after first inj. Less crusts after second, no local treatment.....	.....	Still under treatment.....	.....
23	J. M. Sheffield.	Atro. rhin. and ozena.....	4/8/16	5/30/17	13	?	Rather severe.....	.....	.....	Refused further treatment.....	.....
24	Horn & Victors.	Ozena.....	7/15/15	8/27/15	12	Horn & Victors autogenous.....	2 X.....	Almost free from crusts, no odor.....	Practically well for a year.....	No treatment for a year.....	Very much better, not entirely cured.
25	Horn & Victors.	Atro. rhin.....	3/17/17	.....	6	Horn & Victors.	Mild.....	Already considerably improved.	.....	Still under treatment.....	.....
26	Horn & Victors.	Ozena.....	12/16/16	.....	26	Horn & Victors.	Intense reaction.....	Marked improvement.	.....	.....	.....
27	Horn & Victors.	Ozena.....	7/22/16	9/14/16	12	Horn & Victors.	Slight.....	Great improvement.....	.....	.....	.....
28	Horn & Victors.	Ozena.....	9/26/16	1/31/17	21	Horn & Victors.	Moderate.....	Discharge and odor less. Headache better, crusts more fluid.	.....	.....	.....
29	Horn & Victors.	Ozena.....	10/18/16	1/9/17	18	Horn & Victors.	No reaction.....	Much improved, seems entirely relieved.	.....	.....	.....
30	.....	Ozena.....	.....	.....	4	Horn & Victors.	.....	Improvement.....	.....	.....	.....
31	.....	Ozena.....	.....	.....	.....	Horn & Victors.	Slight.....	90% better.....	.....	Patient left town.....	.....
32	.....	Ozena.....	.....	.....	.....	.....	Slight.....	About cured.....	.....	.....	.....
33	.....	Ozena.....	.....	.....	4	Horn & Victors.	.....	Less crusts and odor	.....	Still under treatment.....	.....
34	.....	.....	.....	.....	8	Horn & Victors.	Slight.....	Slight improvement.....	.....	Still under treatment.....	.....
35	Horn & Victors.	Atro. rhin. with Ozena.....	9/20/16	2/20/17	18	Horn & Victors.	Slight.....	Patient improved.....	.....	.....	.....
36	.....	Ozena.....	9/26/16	12/1/16	10	Horn & Victors.	Slight headache.....	Improvement slight.....	General improvement.....	.....	.....
37	Horn & Victors.	Ozena.....	8/30/16	12/1/16	15	Horn & Victors.	Slight.....	Marked improvement since operation on antrum.	.....	Still under treatment.....	Improvement probably due to operation.
38	.....	Ozena.....	3/31/17	Under-treatment	12	Horn & Victors.	Slight local.....	Case under treatment, no conclusion.....	.....	.....	.....
39	Horn & Victors.	Ozena.....	5/15/16	Under-treatment	30?	Horn & Victors.	Slight.....	Very marked improvement.....	.....	No crusts, odor or headaches.....	.....

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

Complete Mastoid Operation—Its Relation to Modern Healing of Mastoid Wounds.

BLACKWELL, H. B., New York,

Ann. Surg. Phila., 1917—LXVI—640.

The operation provides an additional step in the technic of the orthodox simple mastoid operation, namely, the removal by curettement of the external attic wall, exposing the short process of the incus and the head of the malleus at the point of articulation, together with the curettement of the external and internal attic lying respectively external and internal to the malleoincudal body.

The initial skin incision is extended horizontally over the ear to a point about one-eighth inch above and in front of the auricle attachment, passing through the edge of the temporal muscle. The underlying periosteum being elevated, there is a wide and free exposure of the entire zygomatic region.

On completing the normal simple mastoid operation a small, narrow Spratt curette is passed from the antrum directly forward into the attic until the spoon rests immediately behind the external attic wall. The long axis of the curette should be passed parallel to the same plane as the external semicircular canal and held slightly above it. In this position the short process of the incus is below the curette and not subject to injury.

After curetting away the external attic wall the malleoincudal body is exposed and is usually found imbedded in granulations. These are curetted away both in the internal and external attic spaces.

A small loose drain is inserted as far as the attic and the wound is closed from above downward to within the last half or three-quarters of an inch of the incision. A snug

wet saline pack in the external canal and a copious wet saline dressing externally completes the technic. Dressings are changed daily.

The advantages claimed for the operation are:

1. Less likelihood of the development of those serious intracranial and other complications which sometimes follow an inflammation of the mastoid or an operation for its relief.
2. Reduced healing time.
3. The dressings are less painful.
4. An improved cosmetic result.

Arthur I. Weil.

Abscess of Occipital Lobe.

MARTINI, T., AND BERTERINI, J. I.,

Prensa Méd. Argentina, Buenos Aires, 1917—IV—19.

The man had complained of intense headache for two months, vertigo and other symptoms suggesting a cerebellar tumor. There was a history of a suppurative process in the ear two months before. The man was delirious or unconscious when first seen, and it proved impossible to determine the site of the lesion. Death soon followed, and necropsy revealed two abscesses in the occipital lobe, evidently from blood-borne infection, as the abscesses were in the center of the lobe, not communicating with the surface. One seemed to be old and encysted. The other was recent and had evidently just perforated into the lateral ventricle, but the symptoms had all pointed to the cerebellum.

Emil Mayer.

Hot Air and Calomel Vapors in the Treatment of Catarrhal Deafness and Other Mucous Membrane and Systemic Conditions.

BROWN, EDWARD J., Minneapolis, Minn.,

Med. Rec., N. Y.—1917—October 6.

The writer has found the hot air and calomel vapors superior to any other means of treatment of eustachian and aural catarrh and other inflammations of the mucous membranes. In the treatment of catarrhal deafness, a gentle current of the hot air is passed through the nares and the patient is directed to swallow every few seconds. In case the swelling of the eustachian tubes is such as to prevent the sensation

of air flowing into the ears upon swallowing, after a few minutes of the hot air, the nares should be closed and a sufficient current (minimum) permitted to pass to inflate the ears. The tubes are generally opened with slight if any extra pressure after one or two treatments. In some cases the catheter is used and the hot air applied directly to the tubes. The calomel vapors are then applied to the nasal chambers or directly through the catheter to the tubes and middle ears. The hot air apparatus is a section of half-inch gas pipe about a foot long, placed vertically over a diagnostic gas burner, connected at one end with the compressed air service pipes and at the other with one-fourth inch iron tubing and one-eighth inch brass tubing bent as required to connect by rubber tubing with a glass nasal tube.

The calomel vaporizer is a three-inch section of half-inch gas pipe, over a Bunsen burner, connected at one end with the compressed air, and at the other with a ten-inch section of quarter-inch pipe. The thread of both ends of the latter is filed off to make the ends slightly conical, one to fit tightly in the reducer and the other to serve as a nose piece. One having only electricity could have the tubing wound with a resistance coil, which would be as effective.

Emil Mayer.

**Pathology, Diagnosis and Treatment of Absolute Hysterical Deafness
in Soldiers.** ..

HURST, A. F., AND PETERS, E. A.,

Lancet, Lond., 1917—October 6.

The writers are convinced from their experience that absolute deafness associated with normal vestibular reactions should be regarded as hysterical, and when simple encouragement fails, as will generally be the case if the patient is not also dumb, an "operation" should be performed after the patient has been made to feel quite confident that it will restore his hearing. This "operation" is described as having been applied in two cases of absolute hysterical deafness without mutism, and in one of them mutism was originally present, but spontaneous recovery had occurred some months earlier in which all treatment had failed. The first patient was given enough ether to make him excited, and two small cuts were then made behind his ear: a hammer was banged on a sheet

of iron during the "operation," and the moment after the incision had been made the patient jumped off the table with his hearing restored. The other patient was unwilling at first to undergo an operation, but finally consented, as he was naturally impressed by the recovery of the first patient, who was in the same ward and had been deaf for a much longer period. The same "operation" was performed and complete recovery occurred in exactly the same way. *Emil Mayer.*

Otosclerosis.

FREDRICK, M. W.,

New York Med. Jour., 1918—CVII—153.

The writer points out the inability of cure for these patients and considers that the causal connection between otosclerosis and syphilis seems very alluring in spite of the absence of other stigmata of hereditary syphilis, the negative findings of the Wassermann test, and the fact that antisyphilitic medication is absolutely valueless. The bone changes are identical with the bone changes in syphilis. He further considers that the most important thing in otosclerosis today is the prophylactic side, and in this way we may be of real benefit to question, but those who are under suspicion of having inherited from infancy, with antiluetics or phosphorus, is a mooted all the members of the family in which otosclerosis has shown the otosclerotic. Whether this can be extended to treating posing their bodies, as, for instance, by having them go about in bare legs and without hats in all kinds of weather. By hardening their bodies they at the same time are hardening their ears. Chilling of the surface, whether through swimming, shower baths, wetting the head, or any other cause, should be avoided, as should be all so-called colds. Automobile riding is bad; also exposure to wind and weather, as shown by the large number of severe cases of otosclerosis among country people. The idea of heredity is well spread among the laity, and the authors state that it occurs in from nine to eighty-two per cent. It should be borne in mind that the heredity need not be a direct one, but is more often a collateral one, and that a good deal of seeking is sometimes called for to discover the otosclerotic ancestor, due to the well-known

indifference of most people in these matters. Hitherto it has been thought that these cases were due to local causes in the nasopharynx, and overzealousness in removing any and everything which might lead to local inflammations and their sequelæ was the result. School inspection might help, if one could tell the instructors how to recognize the early stages of otosclerosis, but this is, so far an unknown art. The otosclerotic woman, like the tuberculous woman, should avoid pregnancy; while pregnant she, like the tuberculous woman, seems to improve very much generally, but after parturition her hearing grows decidedly worse. The outlook for the otosclerotic girl is anything but cheerful. To translate the epigram of a French author: For the girl, no marriage; for the wife, no child; for the mother, no nursing. While the mother may be willing to sacrifice her hearing for the joys of motherhood, she should remember the hereditary taint she is conveying to her child. There is one feature of otosclerosis which should make us strive to find some relief for the sufferers from this trouble, and this is that, while the people who are deaf from old adhesive processes of the middle ear or degenerative nerve changes are, as a rule, old people whose life has been lived and whose position in life has been secured; who have passed through the pleasures and disappointments of early and middle life and can afford, as the saying is, to take a back seat, the otosclerotics belong to the younger class, who are just starting out to take their places in the world's work and pleasures. Small wonder that so many of them become victims to the numerous neuroses and insomnia, when it is realized how hard it is for them to make progress in the face of the prejudice against the deaf, how many pleasures they are being deprived of, and how hard it is to conceal their infirmity.

Emil Mayer.

Symptom of Internal Ear Disease.

MYGIND, S. H.,

Ugesk. f. Læger, Kjobenh., 1917—LXXIX—51.

The writer's patient, an elderly woman, had been having suppuration in the left ear for two months, with sudden and extreme dizziness and slight nystagmus. No other symptoms

could be elicited until the patient was given Bartels' biconvex glasses. These prevent fixation and accommodation and thus check the nystagmus movements, but they serve as a magnifying glass for the observer. The writer saw through them that both eyeballs were making small horizontal rotary movements from side to side in a regular rhythm synchronous with the pulse in the radial artery. Modifying the circulation in the labyrinth by compressing the left carotid started powerful nystagmus to the sound ear at first, and then it changed to an opposite nystagmus accompanied by great dizziness. He accepted these phenomena as indicating the existence of a fistula in the labyrinth, and that this fistula had become obstructed by granulations or other cause, the vascular tissue pulsating and thus forcing the endolymph to and fro through the ampulla. The operation confirmed this assumption in every detail, not only in this but in two other cases in which he could elicit nystagmus by pressure on the carotid artery.

Emil Mayer.

Some Observations on the Bárány Tests as Applied to Aviators.

BABCOCK, H. L.,

Boston M. & S. J., 1917—CLXXVII—840.

Besides detailing the methods of examining the vestibular apparatus as regards nystagmus, the pointing tests and falling, the author has made some observations on the effect of turning on the pulse rate. One hundred cases were thus studied.

Average pulse rate per minute before turning.....	78
Average pulse rate per minute after turning.....	87
Average pulse increase per minute.....	9
Lowest pulse rate per minute before turning.....	58
Highest pulse rate per minute before turning.....	108
Lowest pulse rate per minute after turning.....	60
Highest pulse rate per minute after turning.....	124

In thirty cases the pulse rate increased after turning. In twelve cases there was no change. In eight cases the pulse was lower after turning. The greatest increase was from 80 to 116. The greatest decrease was from 76 to 66.

Otto M. Rott.

Gastrointestinal Sepsis, a Cause of Ménière's Symptoms.

HOVELL, M.,

Med. Press & Circ., Lond., 1917—CIV—408.

In this discussion of Ménière's symptoms, the author confines himself to those attacks of dizziness and tinnitus which occur in patients suffering from middle ear disease, and which come on without any reason being apparent, in contradistinction to the same symptoms produced by true Ménière's disease (hemorrhage in the labyrinth), as well as those due to syringing the ear; to rotation of the patient; to an extension of suppuration to the labyrinth; to an acute disease from inflammation or infective processes extending to it; to vasomotor disturbances which accompanying the menopause; or where the cause is obvious.

The manner in which gastrointestinal sepsis produces these symptoms is by the associated congestion of the pharynx and nasopharyngeal catarrh, with consequent closure and catarrh of the eustachian tubes.

Treatment is directed to the gastrointestinal tract as well as local measures to nasopharynx and eustachian tube. In addition to inflation, the author injects into the tubes through the catheter a few drops of collosol argentum, or collosol iodine, in the form of a spray. Same medicine is sprayed into the nasopharyngeal mucosa.

The author states that this method has been most successful in relieving tinnitus due to any cause, even where deafness remains.

*Otto M. Rott.***War Deafness and the Oral Method.**

DE PARREL, G.,

Rev. de laryngol., etc., Paris, 1916—XXXVII—401.

As a result of the war, numerous cases of deafness are occurring among the French soldiers. For the treatment of these there have been established so-called centers of auditory reeducation. At these clinics the treatment consists of the reeducation by the oral method of Itard.

The author in an interesting article gives the early history of this method, "which was first used in the treatment of

deafmutes in the beginning of the eighteenth century." It remained for Itard, at the National Institute of Deafmutes, however, to put the method into active operation. Later it fell into disuse, and the credit of its revival is to be given to Urbantschitsch in 1888. Since that day it has been taken up with various modifications of a mechanical nature all over Europe. Recently Tillot has devised a speaking tube which presents several new and improved features. The author describes this at length and states that by means of it the oral method is capable of much more intelligence and satisfactory application.

He then discusses at some length the relation between the purely oral method and reeducation by means of the various mechanical appliances, and points out that the two are not, in spite of all that has been said to the contrary, antagonistic, but rather supplemental to each other. "The principle of all sensory reeducation is the functional awakening of a sense by its specific physiologic excitant. For the hearing it is stimulation by sound, and in particular the human voice." "The instrumental method is the perfecting and putting in practice of the oral method. It strives to supplement the human voice, which is easily fatigued, limited in its extent and impossible of being graded with exactitude in the intensity and amplitude of its vibrations." The instrumental method does not exclude the oral method. It would be a serious mistake not to make use of it. Indeed it possesses certain advantages which the oral method does not possess. The oral method teaches the deaf to hear, develops the function of auditory accommodation, awakens the faculty of attention. Both the ear and the spirit are aroused at the same time. The instrumental method, on the other hand, causes the deaf to submit to the physiologic action of the sound wave. The labyrinth is excited. The chain of ossicles is passively vibrated. Circulation is stimulated. The deaf person is compelled to hear. It is not, properly speaking, reeducation, but rather an external massage of the muscles of the ear, an auditory or respiratory gymnastic.

For the purpose of accurately describing the whole system of auditory reeducation, the author has devised the word "anacousie," which he defines as a science at once physical and physiologic, which has for its aim the arousing of the

hearing by graduated, sonorous excitation of the labyrinth, regeneration of the tissues and auditory tract by circulatory and kinetic action, the reeducation of the functions of auditory accommodation and of attention by oral exercises.

He includes in this term:

First.—Reeducation by the voice directly or transmitted by acoustic tubes, the phonograph, microphonic apparatus.

Second.—Sonorous massage by platinum plates electrically vibrated or by sirens, etc.

Third.—Auditory and respiratory gymnastic.

Fourth.—Diathermia.

Fifth.—Lip reading, etc.

He urges that undue attention should not be directed to the particular method employed; that a broad view of the subject is necessary; that much remains to be accomplished. He concludes the article by the detailed report of ten cases of loss of hearing acquired in battle. In nine of the ten cases remarkable improvement was secured by auditory reeducation. Based on the results already secured, he is exceedingly enthusiastic in regard to the benefits of all cases of war deafness.

Harris.

Contribution to the Study of Otitic Meningitis.

JACQUES, P.,

Rev. de laryngol., etc., Paris, 1915—XXXVI—233

Jacques reports two cases of cured meningitis. The first was a case of mastoiditis following scarlet fever, in which, the ninth day after operation, symptoms suggesting Gradenigo symptom complex presented themselves, especially were there paroxysmal attacks of severe pain.

The case was regarded by the author as well nigh hopeless. Lumbar puncture was refused. Suddenly the following day the temperature dropped and the meningeal symptoms cleared up, following a profuse discharge of pus through the mastoid wound.

The second case was that of a miner, suffering from secondary infective fracture of the labyrinth. A general purulent meningitis developed, confirmed by pus demonstrated in the spinal fluid obtained by lumbar puncture. The labyrinth was

drained by the curetting of granulation tissue in the fistula, which was found present in the external semicircular canal. Following the lumbar puncture and this operation there was a prompt improvement with eventual recovery.

Jacques regards the first case as one undoubtedly of meningitis in which the recovery was due to the spontaneous drainage from the mastoid wound, and the second case as cured by prompt and thorough drainage. *Thos. J. Harris.*

**Intervention of the Supraauricular Route, With the Report of a Case
of Otitic Paralysis of the External Ocular Motor Nerve.
Associated With Trifacial Neuralgia.**

BROECKAERT,

Rev. de laryngol., etc., Paris, 1915—XXXVI—209.*

The author describes at length an interesting case of otitis, giving rise to the Gradenigo symptom complex, associated with trifacial involvement, and the method of relief by means of exposure by approach through the supraauricular route.

The operation is described in detail.

The author concludes, first, that in his opinion the appearance of an external ophthalmoplegia associated with involvement of the trifacial, in the course of an acute or chronic otitis media, is an indication of a lesion situated in the region of the apex of the pyramid; second, this double syndrome can depend upon an apical otitis, which at times, however, does not exist and the cause is to be found in a localized meningitis; third, that the involvement of the Gasserian ganglion is always a grave symptom, and demands immediate opening of the mastoid, followed by radical intervention directed to the summit of the pyramid; and finally, that the simplest and safest route for uncovering the apex of the pyramid and the region of the ganglion is the supraauricular route, as devised by the author, permitting the retrogasserian neurotomy.

Thos. J. Harris.

Deafness From Injury to the Internal Ear Arising in Battle.

GOT,

Rev. de laryngol., etc., Paris, 1916—XXXVII.

The author has had an opportunity of studying cases of this nature which have occurred in the army district controlled by Professor Moure. They are of two kinds: First, those due to concussion, the result of a shell explosion at a distance of from two to five meters, and second, those due to actual wounding by a ball or piece of shell.

In the first case the injury sustained is apt to be transient and soon disappears. In the latter case the injury is apt to be severe, especially when there is a fracture of the bone itself, and the result may be a complete destruction of the organ of hearing.

The author has analyzed the cases which have come under his care and finds, contrary to what might be expected, that the percentage of patients suffering from trouble with the inner ear as a result of traumatism is greater where there has been no previous involvement of a catarrhal nature of the middle ear.

The pathologic anatomy is to a large extent theoretic in the milder cases. It has to do with a concussion of the inner ear, due to the shock produced by the displacement of a mild compression of the extra- and intralabyrinthine fluid. In the more severe cases there is in all probability a hemorrhage in the cochlea and vestibule, with injury or destruction of the membrane of Corti.

The symptoms are those of deafness which has the characteristic that when once developed it has never been seen to increase in severity. There is always an abolition of bone conduction, with abolition or considerable diminution of aerial conduction. The second symptom is tinnitus, the third vertigo, which tends to disappear in time, and the fourth symptom, spontaneous nystagmus, which also is wont to gradually disappear.

The diagnosis has to be made only from hysteria or simulation. The prognosis depends upon the extent of the injury. In treatment, the author makes use of a solution of bromids

and iodids with counter irritation over the mastoid. No local treatment at all is directed toward the ear itself.

Thos. J. Harris.

Experimental and Clinical Demonstration of Sound Conduction.

MAURICE,

Rev. de laryngol., etc., Paris, 1916—XXXVII.

Maurice has constructed an ingenious model of the ear, in which the drum, ossicle and oval window, etc., are represented. With this he has been able to carry on a series of experiments to demonstrate certain interesting problems in acoustics. He has also carried out a parallel series of investigations upon the ears of the living.

His conclusions are as follows:

1. That sound vibrations which the drum membrane receives can be transmitted at times by the ear (round window), by the chain of ossicles (oval window), and by bone.

2. That rigidity of the ossicles does not perceptibly interfere with sound conduction. It prevents, on the other hand, accommodation. The articulation of the ossicles has to do only with accommodation, and in no way with the transmission of sound.

3. That spongification of the ossicles and of the labyrinthine capsule interferes with sound transmission, the amount of interference with transmission corresponding to the failure of the thickened or attenuated drum to vibrate for certain sounds. In sclerosis of the middle ear, with the drum virtually normal, deafness is due principally to bone changes.

4. That the round window plays the rôle of a valve. This rôle loses its value when there is a tympanic perforation of the drum membrane or a disappearance of the ossicles.

5. That when there is a loss of the organs of the middle ear, the rôle of the round window can be supplied by the oval window, but it is always necessary that one of the two windows should be protected against vibration.

6. That the eustachian tube serves to equalize the atmospheric pressure upon the two surfaces of the drum membrane, but it ought to be closed in order to permit good hearing. Its periodic opening should be only momentarily.

Thos. J. Harris

II.—NOSE.

The Use of Celluloid in the Correction of Nasal Deformities.

NEW, G. B., Rochester, Minn.,

J. Am. M. Ass., Chicago, 1918—LXX—988.

In the five cases in man the celluloid was obtained in a block about a foot square and three-eighths inch thick, and sawed into pieces as needed by means of a "fret" saw. Several pieces, approximately what would be required, were shaped with a file before each operation, and then perforated with small holes about 1.5 millimeters in diameter by means of a drill. Pieces varying from two to four millimeters in thickness have been used; they also are boiled ten minutes for sterilization.

A curved incision extending down to the bone is made across the nose between the eyes where the bridge of a pair of glasses would rest. With small, blunt, curved eye scissors a pocket is made in the midline of the nose down to the tip. Care must be taken to keep the pocket in the midline and not to enter the nasal cavity. The piece of celluloid which will best correct the deformity is selected from those previously prepared, and if any trimming is needed, it is placed in hot water, when it may be cut with a knife as readily as cartilage; on cooling it becomes hard again. If it is necessary to curve the implant, placing it in hot water makes this possible, and it should be held in the required position until it is cooled.

After the celluloid has been shaped, it is inserted down to the tip of the nose; the wound is closed with horsehair and sealed with tincture of benzoin compound. A thin copper splint is applied externally and held in place by adhesive plaster. In all the five cases the wounds healed primarily with practically no reaction. The implants have remained in position and have given no trouble; some of them have been in place for more than a year. I have not had an opportunity to use celluloid in a flap operation, but see no reason why it could not be thus used.

The writer concludes thus:

1. It eliminates the necessity of taking an autogenous transplant.

2. It causes practically no reaction when inserted in the tissues and apparently is not affected by them.

3. It may be readily trimmed or curved when placed in hot water.

4. It remains stiff even when trimmed quite thin.

Emil Mayer.

Fibroma of the Ethmoid Region.

FOWLER, ROB'T H., New York,

Laryngoscope, St. Louis, 1917—903.

The chief complaint of this patient was obstruction in breathing. Examination revealed a polypoid mass completely occluding the right nostril. The laboratory reported, on a piece of the growth snared off, "fibroma, hard in part; round cell infiltration."

The question of malignancy arose. The patient was operated under general anesthesia, the anterior part of the growth being removed with a snare, while the posterior part was removed with adenoid forceps through the nasopharynx in two masses each about the size of a man's finger. Great shock and hemorrhage were experienced at the time of operation. As soon as the mass was removed, the hemorrhage lessened, permitting examination of the cavity before it was packed. A large part of the ethmoid cells came away with the mass, and the ethmoid cavity was left open. The pathologic report on the specimen was: "Complex growth; fibromatous infiltration of polyps with inflammatory invasion. Vessels well formed; very highly vascular, a point against its being sarcoma." Proliferation, about a month afterward, of the pieces which remained were checked by several injections of trichloroacetic acid after the method of Dr. Harmon Smith, and no further treatment was used except the use of ichthyol ointment to improve the condition of the membrane, upon which huge scabs formed soon after the operation.

Previous to operation the patient's weight had been stationary, for two years at one hundred and ten pounds, but since he has gained twenty pounds and his health is excellent.

Jos. D. Heitger.

**Reoperation of Incomplete Submucous Resection of the
Nasal Septum.**

MOSHER, G. W., Chicago.

J. Am. Med. Ass., Chicago, 1918—LXX—843.

The writer has adopted the following method, which has thus far proved perfectly satisfactory. Killian incision on the convex side, elevate the membrane as completely as possible without disturbing the part attached to the opposite membrane, incise the cartilage anterior to the old window and elevate the other membrane. The Freer knife or sharp elevator is needed, and working from within outward to the side of the first incision, cut as clearly as possible around the adherent mucosa, leaving it attached to the other mucosa, thus making a corresponding hole in the incised membrane. Complete the elevation of the membranes and finish the operation as in an uncomplicated case.

By this method of procedure, the membrane on the concave side can be kept intact almost as easily as in a typical case, while the membrane on the convex side has only the original incision and a comparatively clean incision about the adherent portion. As a consequence, there is a minimum of traumatism. Healing is little, if any, slower than in an uncomplicated case, and the final result is comparable to that of a typical primary operation.

Emil Mayer.

New Surgical Treatment of Atrophic Rhinitis.

GRIFFIN, EDWIN A., New York.

Med. Rec., N. Y., 1917—October 27.

The nose is anesthetized in the usual way. The mucous membrane with its submucosa of the inferior turbinate is incised from the posterior tip to the anterior tip down to the bone. The membrane is now stripped downward and allowed to drop to the floor of the nose. The turbinate is then fractured toward the septum, by passing any flat long instrument, such as the ordinary blunt septal elevator, along the external surface of the bone.

The nasal cavity is then packed with strips of plain gauze saturated in albolene oil, being careful to pack both on the

external and internal surface of the turbinate, as packing the nasal cavity internal to this bone would only push back the fractured fragments into place. The nose is then treated as after any surgical procedure.

In about seven weeks we have an entirely different looking turbinate. The triangular raw surface produced by the operation fills in with granulation tissue, and the mucous membrane grows over this area. The growth of the membrane is aided by the hyperemia produced in the upper and lower segments of the turbinate by the incision.

This surgical technic is followed in the other nostril in about two or three weeks, according to the convenience of the patient.

No astringents should be employed in the dressings. Silver nitrate in five per cent solution can be used for exuberant granulations.

This method may be employed in idiopathic atrophic rhinitis, or as a reconstructive method after destruction has already resulted from infection of the sinuses, especially the ethmoidal.

This operation is not a panacea for all atrophic cases, and should not be resorted to until all evident causes for the atrophic condition have been removed.

Emil Mayer.

Nasal Insufflation in the Diagnosis, Prognosis, and Treatment of Tuberculosis.

PAGET, OWEN, Freemantle, West Australia.

Med. Rec., N. Y., 1917—October 20.

Applications are made through glass tube bent at a right angle. One end of the tube, the end, in fact, which is passed into the nose, is drawn out to a fairly fine point. The other end is slightly flanged outward to facilitate emptying the powder into the tube. An ordinary rubber bulb syringe with a nozzle, which will fit into the large end of the glass tube.

The dose of tuberculin B. E. powder, which varies from milligram 1/20 in severe cases to milligram 1/10 in the more ordinary cases, is poured into the glass tube at the large opening. The outward turned flange has the good quality of preventing the powder from falling outside the tube. It is es-

sential that the tube be perfectly dry inside, otherwise the powder sticks and cannot be insufflated. The powder when poured into the tube naturally stops at the angle. The tube is next taken in the hand, and with care to prevent the powder falling out, the pointed end is directed into the nose. This end should be carried as high up into the nostril as can be comfortably tolerated by the patient, and a matter of great importance is that the point shall be directed toward the frontal sinus. On no account should the tube be directed backward toward the pharynx. After the tube is in place the patient is directed to hold it firmly in his hand. He must hold it firmly, as otherwise there is a danger at the moment of insufflation of the point of the tube moving, and perhaps causing pain and discomfort in the patient's nose. The glass tube in place, and firmly held by the patient, the physician inserts the nozzle of the rubber bulb syringe into the large end of the glass tube and by a quick squeeze blows the powder in the tube high up into the nose.

It seems as if the capacity of the epithelial cells to form antibodies is more highly developed in the upper regions of the nose than in the region of the lower part of the septum and the inferior turbinates. Pouring the powder into the tube, inserting the tube into the nostril, and squeezing the insufflator, takes perhaps one minute.

He has given large doses of tuberculin as insufflations, and produced severe reactions of temperature, and did not find that they produced extension of disease, and some of these cases have been carefully examined by medical men skilled in tuberculosis work. These severely reacting cases have, after the reaction passed off, done remarkably well.

When treatment commenced, the temperature level was from 99° to 101°. Treatment consisted of insufflation of milligram 1/10 on four consecutive days. The day after the last insufflation the temperature rose to 102°, and from then onward steadily fell, so that eight days after the last insufflation it was down to the 98-100° level.

With the fall in temperature there is a corresponding improvement in physical signs and general condition. Usually, even at the height of the curve, the patient's appetite is good, and he is taking his food freely and willingly.

For diagnosing tuberculosis he gives an insufflation of milligram 1/12 every second day for six doses. This occupies a period of roughly a fortnight. If at the end of that time, or before, the patient's temperature has definitely reacted, then it is probably a severe case. On the other hand, if the patient is definitely improved in health, with a fall of temperature to normal, then a diagnosis of tuberculosis in a mild form is made, and the insufflations as a treatment are carried on for another two to four weeks. At the end of this time the patient should, in a mild and early case, be either well or sufficiently nearly so to require only a few days' holiday. A reaction with insufflations of moderate dosage is an expression of a distinctly enfeebled resistance against the disease, and the amount of reaction is probably in direct proportion to the poverty of resisting power, and hence enables a definite prognosis to be given.

Emil Mayer.

Tuning Fork Test for Disease of the Nasal Sinuses.

OPPIKOFEK, E.,

Cor.-Bl. f. Schweiz. Aerzte, Basel—XLVII—1121.

The writer states that he was unable to confirm Glas' statements in regard to the diagnostic importance of the Weber tuning fork test applied in the diagnosis of diseases in the nasal sinuses. He applied the test to sixty-nine adults with certain sinuitis, and obtained a positive response only in four—that is, in 5.8 per cent, and the response was not decided in these.

Emil Mayer.

A New Nasal Splint.

STEIN, OTTO J., Chicago,

J. Am. M. Ass., Chicago, 1918—LXX—224.

The general practitioner as well as the rhinologist can find use for a good intranasal splint to hold cotton or gauze in contact with the septum. The cotton can be dusted with a powder, moistened with a liquid, or impregnated with a salve, and accurately held in contact with the membranes. This is useful in the treatment of fractures of the nose, epistaxis, ulcerations, etc., and is strong and adjustable. The splint

illustrated fills all of these needs. It is readily adjustable to any degree of pressure. It is made in two parts, making it very easy of introduction. When properly placed, it allows free breathing through the nostrils.

Emil Mayer.

Hay Fever—New Surgical Treatment.

MILLER, T. P., Knoxville,

The writer says that there is a condition in all cases of hay fever of highly sensitized parts of the mucous membrane supplied by the olfactory nerve. This is caused in all cases he has seen by a malformation of the nose. This malformation can either be an enlarged superior turbinate, a deviated septum or a very close nose. At any rate, there is a pressure between the superior turbinates and the septum, causing a highly inflamed and sensitized condition of the mucous membrane at the ramifications of the olfactory nerve. These are the patients who have hay fever. He relieves this pressure by removing the superior turbinate or by the proper application of trichloroacetic acid.

Emil Mayer.

Ozena in the Different Races of the Earth.

ROY, J. N., Montreal,

Rev. de laryngol., etc., Paris, 1915—XXXVI—238.

In the course of many voyages covering the last fifteen years, Roy has made a careful study of the various races as to ozena. He makes the interesting observation that careful examination of the native Africans does not show in a single instance a case of ozena. On the other hand, the yellow race of Asia is especially predisposed to atrophic rhinitis.

In the same race, and especially in Indians, deviation of the nasal septum was observed in fully forty per cent.

Roy feels that his clinical observation regarding the native of Africa is a convincing proof that ozena is a disease of microbic origin.

Thos. J. Harris.

Voluminous Angioma Involving the Lateral Wall of the Nose and Cheek, of Rapid Evolution, Causing Death in a Child of Three Years.

GAREL AND PISTRE,

Rev. de Laryngol., etc., Paris, 1915—October 31.

The growth originated as the result of a fall on the nose, and made its appearance six months after the fall, in the right ala. Total extirpation was practiced, but a recurrence took place. Following this, the X-ray was employed, at first in massive doses, and for a considerable length of time. The results for a time were encouraging, and the growth became much smaller. Later it returned, causing death.

The author is of the opinion that if the electrical treatment as at first practiced had been continued, instead of weak doses for a short time, which were substituted, the growth might have been entirely conquered and the child saved.

* *Thos. J. Harris.*

Freeing of the Mucosa by Paraffin in Operations Upon the Nasal Mucosa.

CHABERT,

Rev. de laryngol., etc., Paris, 1915—XXXVI—270.

Because of the difficulties of the submucous operation, as well as the time required for its performance and the frequent accidents of anesthesia, the author favors the method devised by Furet, of loosening the mucous membrane on the concave side, freeing it from the cartilage, which is then removed, together with the membrane on the convex side, by scissors or bistouries.

In this way there is no danger of wounding the mucosa that has been freed and which is to serve as a future septum.

He admits the objections to the operation so far as it means a removal of the mucosa on one side, with the possibilities of delayed healing. He argues, however, that the rapidity with which the operation can be performed, together with its simplicity, justify it in the hands especially of those who do not possess the requisite technic for the more difficult operation.

The elevation of the mucous membrane is secured by the injection of paraffin, which properly introduced bellies out

the mucosa. Care should be taken that as few punctures of the membranes are made as possible. The paraffin easily escapes after the cartilage has been removed. It possesses decided advantages over that of water, which has been employed for this purpose.

Thos. J. Harris.

Frontal Sinus Operation (Lothrop) Performed Under Local Anesthesia.

BOEHRINGER, M. P.,

N. Orl. M. & S. J., 1918—LXX—721.

The report concerns a case of pansinitis in which the Mosher ethmoid operation was performed, including removal of the middle turbinate and the anterior wall of the sphenoid. At the same time a modified Lothrop operation was performed under local anesthesia.

Anesthesia for the frontal sinus operation was obtained by injecting one dram of one-quarter per cent novocain solution beneath the skin of the left eyebrow, about one-quarter inch from its mesial margin, then deeper into the superficial tissue and finally beneath the periosteum. The supraorbital, supertrochlear and infratrochlear branches were then injected. The entire anesthesia about the frontal sinus externally was accomplished with a single skin puncture, with a two inch needle, withdrawing the needle just far enough to inject each succeeding area, but not withdrawing it entirely out of the skin.

A point of interest is that the nerve blocking was so successful that it was not found necessary to cocaineize the mucous membrane of the frontal sinus before curetting.

Arthur I. Weil.

Experiment in the Use of Neosalvarsan in Ozena.

PISTRE,

Rev. hebdomadaire de laryngologie, etc., Paris, XXXVII—January 15.

Following the example of other investigators in employing neosalvarsan in affections other than that of syphilis, the author made use of the drug in the case of a woman of twenty-eight, suffering from pronounced ozena, where there

was a clear syphilitic history. A previous course of injections of mercury had been without any result.

In all, the author made thirteen injections of neosalvarsan in three courses of treatment. The result was exceedingly satisfactory. The patient put on weight and the condition of the nose materially improved so far as symptoms were concerned.

Thos. J. Harris.

Nasal Septum Deformity in Children.

KAEMPFER, L. G.,

Laryngoscope, 1917—XXVII—868.

The youngest child was five weeks old, the oldest seven years old. The majority of the children ranged in age from two months to four years. There were ninety-nine children in the first year of life. Forty-two under six months, and fifty-seven between six and twelve months old. Between one and two years of age there were fifty-seven children; between two and three, there were thirty-eight. From the fourth to the fifth year, there were four children, and one each in their sixth and seventh years. Of the total, there were 49 per cent of septal deformities, 20 per cent of frank deviation, and 30 per cent of septal thickenings. As an evidence that the thickened septa were but forerunners of frank deviations later on, are cited the following statistics:

In the first year the proportion of true deviation is 8 per cent, and in the fourth year 55 per cent. The thickened septa, which are 25 per cent in the first year and 45 per cent in the second, fall to 32 per cent in the third and 15 per cent in the fourth year.

Less than 5 per cent of the total cases with deviation had hypertrophied inferior turbinates. About 4 per cent had hypertrophy of the middle turbinates.

The following statistics deal with the relationship of septal deviations to hypertrophied tonsils:

Of the 108 children with septal deformity, 85 per cent had hypertrophied tonsils. Of 112 children without septal deformity, 77 per cent had hypertrophied tonsils. Of the 180 cases of hypertrophied tonsils, 53 per cent had septal deform-

ity, while of the 27 cases with small tonsils, only 18 per cent had septal deformity.

The author believes that hypertrophied tonsils and septal deformities have a common etiologic factor, and that factor seems to be the chronic rhinitis. A vicious circle is started, beginning with the narrow nose, this causing rhinitis, and this in turn increasing growth of tonsils and adenoids. The latter increase again the rhinitis which, in turn, aggravates the septal deformity.

Otto M. Rott.

III.—PHARYNX AND MOUTH.

A Mouth Gag.

ALLPORT, FRANK, Chicago,

J. Am. Med. Ass., Chicago, 1918—LXX—768.

With the exception of the device for opening the jaws, this gag is the same as the Jennings mouth gag, except that it is perhaps a bit stronger.

Considerable time can be saved by using this gag, because with others we have to wait until the patient is absolutely relaxed before beginning to remove the tonsils, whereas with this gag the force is so strong that a mouth can be opened before complete relaxation occurs. It is made in two sizes.

Emil Mayer.

Seltzer Water to Clear the Throat.

COMBY, J.,

Bull. Soc. méd. d. hôp., Paris, 1917—XLI—31.

The writer reports that ulcerating, necrotic sore throat can be effectually cleared out by spraying with the jet from a seltzer water siphon. He lengthens the nozzle with a rubber tube ten or fifteen centimeters long, which is laid on the tongue depressor, held by the left hand. The carbonated water jet washes out the throat, to the great relief of the patient, child or adult. In a recent case of a scarlatinal ulceronecrotic angina, the final recovery of the patient, a young soldier, is attributed to this siphonage of the throat repeated several times a day. He clamored for it after the first trial. Labruhe

introduced this seltzer water spray method, and others have used it in severe anginas with constant satisfaction.

Emil Mayer.

Primary Tuberculosis of the Tonsils.

EDITORIAL NOTE.

J. Am. Med. Ass., Chicago, 1917—October 27.

In recent years the tonsils have been regarded as the portal of entry for many diseases, but it does not appear that examination of tonsils after removal has yielded much information of value in regard to their supposed relationship to disease elsewhere. Mitchell, however, has recently published some interesting observations from Edinburgh on primary tuberculosis of the faucial tonsils obtained from children with tuberculosis of the upper cervical lymph nodes, and from children with enlarged tonsils only and without evidence of tuberculosis of the cervical glands or elsewhere. In the first group were one hundred children and six adults. In no case was it possible to establish the presence of tuberculosis prior to removal and examination of the tonsils. The tonsils were rarely painful, and there was no symptoms except swelling of the upper cervical nodes, which in about one-fourth of the cases was slight, and in the rest rather extensive. On microscopic examination forty-one, or thirty-eight per cent, of the tonsils were definitely tuberculous. Animal inoculation in ninety-two cases gave twenty positive results, the bovine type of bacillus being isolated in sixteen. There were one hundred cases, all in children, in the second group with enlarged tonsils only. The cervical glands were palpable in all. Microscopically nine of these tonsils were tuberculous also, all nine giving positive results on inoculation. The type of organism in four was bovine, in two human, and in three undetermined.

The tubercles in the tonsils were situated near the deeper portions of the crypts, and also directly beneath the surface mucosa, as well as deep in the tonsil close to the capsule, the first two being the favorite locations. The position of the majority of the tuberculous foci in places within easy access of the oral cavity may be taken as suggesting infection by way of the mouth rather than by way of the blood or lymph by

backward transport. The absence of any signs of pulmonary tuberculosis in such cases as these studied by the writer may be regarded as evidence that the lesions in the tonsils are primary and not the result of infection from the sputum, and also that the cervical lymph nodes are probably secondarily infected from the tonsils. The latter conclusion would point to the necessity of removal of the tonsils in operation for removal of tuberculous cervical lymph glands. The importance of the milk supply as a source of the infection in cases of tonsillar tuberculosis is emphasized by the fact that in many instances in the series under consideration the infecting organism was of the bovine type. Indeed, the results recorded by the writer, which are of special interest because of the large number of cases in which he found tuberculosis, should stimulate to other and even more extensive studies of tonsils, removed for whatever reason, in order that their relation to tuberculous infection and possibly also to other conditions may be determined still more precisely than is the case at the present time.

Emil Mayer

The Menace of Mouth Infections.

OSBORNE, OLIVER T.,

J. Am. Med. Ass., Chicago, 1917—October 20.

The writer considers that there is not a greater menace to health today than crowned and bridged teeth, to say nothing of imperfectly filled and dead teeth and of pyorrhea alveolaris. Infection of the tonsil and the sinuses adjacent to the nose must never be overlooked, and eradication is the only safety. From infected areas in the mouth many pathogenic organisms have been isolated, probably the most dangerous being the pneumococcus and the streptococcus viridans. In a reference to the treatment of pyorrhea alveolaris he emphasizes the fact that dentists use iodine too freely on the gums. A little pain here or a little infection there, and the gum is injured by repeated applications of iodine. He further states that one of the saddest things that can happen to a person is infection of the blood with the streptococcus viridans. In the vast majority of cases the only hope for the patient with this infection is to eradicate it from the mouth before it infects

the blood and causes malignant endocarditis. Cooperation between physician and dentist is necessary in the handling of these cases. The relation of mouth germs to arthritis deformans seems proved, hence eradication of the source of infection before the joints are affected should be the preventive treatment of today. The writer draws the following conclusions from the results of study and work with cases of mouth infections: (1) Most unexpected tolerance to pyorrhea alveolaris and to tooth infection is found. (2) Chronic invalidism may be caused by mouth infections. (3) The blood pressure may be raised or lowered by mouth infections. (4) The thyroid gland is frequently enlarged, and may hypersecrete or hyposecrete in these infections. (5) Serious disturbances of the blood, heart, kidneys, stomach, intestines, and joints are frequent from mouth infections. (6) Glycosuria can be, and perhaps true diabetes mellitus may be, caused by mouth infections. (7) Serious distant focal infections may occur from mouth infection. (8) Serious brain and nerve disturbances, as well as neuritis, may occur from mouth infection. (9) Ulcer of the stomach, pyolitis, appendicitis, and chronic colitis may be caused by pyorrhea alveolaris and mouth infection. (10) Pneumonia, especially that which follows influenza, may frequently be caused by pneumococci long carried in the patient's mouth. (11) No treatment of these conditions will be of any avail until the mouth is made clean. (12) Stock or autogenous vaccines are not very promising as to their therapeutic value, but in obstinate cases they should be tried. Therefore it is generally well to grow a culture from the infection in the mouths of these patients, that autogenous vaccines may be made and used if desired. (13) One should be very careful not to promise a cure of a distant condition, although that condition was caused by the mouth infection. However, many brilliant cures are caused by surgical eradication of infected areas. The patient should always be told that the surgical removal of the infected area in the mouth does not remove the germ localized in distant parts of the body, nor does it immediately cure an inflammation caused by these germs in a distant part, nor will it restore degenerated tissue, but it will remove the primary source of infection. (14) It should be urged that any fresh lesion of the mucous mem-

branes of the mouth is a source of danger, much as is a lesion of the skin. The efficiency of the integument in warding off disease germs has long been recognized. It should be recognized that fresh cuts, abrasions, and blistering of the mucous membrane of the mouth with iodine or other strong escharotics offer the opportunity for the absorption of germs that may be freshly received into the mouth, and more especially of germs already in the mouth. *Emil Mayer.*

Sarcoma of Tonsil—Radical Operation.

SEMKEN, GEORGE H.,

Med. Rec., N. Y., 1918—March 9.

A man forty-nine years of age, a clothier by occupation, came under observation on June 19, 1917. His family history and previous personal history were negative. He had not been subject to tonsillitis, and there was no definite etiologic factor except possibly his free use of cigars for many years. During the preceding six months he had some difficulty in swallowing and occasional pain in his throat: about one week previously he had noticed that the right tonsil was considerably enlarged. There were no other symptoms. Examination showed a walnut-sized, smooth, round mass at the site of the right tonsil, which had drawn down the faucial arch on that side, and had pushed the uvula to the left of the median line. The mass was of firm consistency, pink in color, and covered with mucous membrane except in two small areas—one near the uvula, which was gray but unbroken, and one near the anterior faucial pillar, which was dull red and seemed to be an erosion as from a tongue depressor or other instrument. The mass was well defined and showed no invasion of the surrounding tissues. The other tonsil was small and seemed normal. There were no palpable lymphatic glands in the neck. The operation was done on June 22, 1917, at the New York Skin and Cancer Hospital, under ether-colonic anesthesia. As a first step, the radical extirpation of the submental, submaxillary, digastric, and carotid lymphatic gland packets was done, and the neck wound closed with sutures, provision for drainage being made. The tonsil tumor was then removed through the mouth. Three silk traction sutures were placed—one

above the anterior faucial arch on the right side, one at the lower end of the right anterior faucial pillar, and one at the base of the tongue. The mucosa was then incised wide of the tonsil rim, and the tonsil was removed with its capsule. A piece of the uvula was included also. The bleeding was checked with Kocher hemostats and the Blunk forceps, and the entire wound was then cauterized with the Percy cautery at a dull red heat. As a final step, the tonsil cavity was packed with iodoform gauze, which was held in place by sutures passed through the anterior and posterior wound margins, and tied over the gauze. The patient's recovery from the operation was uneventful. There was a sharp febrile reaction for a few days, but the temperature soon became normal and remained so. The neck wound healed per primam. The tonsil packing was removed after twenty-four hours, and the wound in the fauces gradually closed. As cicatrization advanced, the uvula was drawn toward the right side, so that at present, with the healing process complete, the uvula lay against the right side of the fauces. A point to be emphasized in the use of the cautery in the mouth and pharynx was the necessity of preventing the entrance of smoke into the bronchi and lungs with each inspiration. This was best accomplished by the use of a small motor blower attached to a pharyngeal tube, which blew the smoke out of the mouth as soon as it was formed.

Emil Mayer.

Operations for Harelip and Cleft Palate.

GEWIN, W. C., Birmingham, Ala.,

Med. Rec., N. Y., 1917—October 20.

It is generally conceded that the earlier in life the operation is performed the more advantageous it is for the production of good results; yet many adult patients are received and operated upon, the operation being followed by almost perfect results.

When we consider the physical discomfort of a baby afflicted with cleft palate and harelip, and his inability to obtain his nourishment properly, thus causing an undernourished condition which invites various ailments, and that, if he survives the ills of his infancy, he is confronted by lessened

physical and mental health and growth and the constant humiliation of his deformity, we have sufficient reason to advise an early operation.

The harelip should be closed in earliest infancy, and as soon after the healing of the wound as the surgeon considers advisable the palate should receive attention. It is, of course, understood that the child must be in good physical condition, as complications may occur even in the most favorable cases. There is not usually an accompanying hemorrhage, yet one of the large arteries may very easily be cut, and a most persistent leakage result. It is also very difficult to prevent the swallowing of blood, which may be followed by an alarming high temperature, most difficult to control.

It is highly desirable to keep a continuous record of each patient after he leaves the hospital, to watch the child through its growth and development, in order to determine the success of our operations, for success can be measured only by the end results. We may be able, in this way, to correct our own personal defects of procedure.

Emil Mayer.

Radium Treatment of Cancer of the Tonsil.

LANNOIS, M., AND MOUTET.

Lyon méd., 1917—CXXVI—11.

The writers report the present condition of patients given radium treatment a year or more ago. One young man has nothing left of his tonsils, and the enlarged glands in the neck and axillæ have subsided to normal size and shape. He has been an active wage earner during the past year, but recently some enlarged glands were palpated in the inguinal region. They do not seem to be metastases but a new manifestation of the lymphadenia to which he is subject. Two other patients are at work with no indication of recurrence. In a fourth case, a woman of seventy-four years was treated for a lymphosarcoma in the left tonsil. A needle with stout thread was passed through the anterior pillar, and the platinum tube containing forty-eight milligrams of radium was drawn by the thread into the depths of the tonsil, a hole being burrowed for each end of the tube in the abnormal tonsil tissue. A small tampon of gauze was placed over it, and the

tube was left in place for nineteen hours. The dose applied was nine hundred and twelve milligram hours. Improvement was rapid, the tumor promptly subsiding, and in a month or two both tonsils had completely retrogressed. In another case the cancer in the tonsil was far advanced, but the symptoms were notably improved by implanting the radium tube in a slit made with the bistoury in the tumefied tonsil. It was left in place for twenty-four hours, and the condition was much relieved. The application was repeated later, and swallowing became less difficult, but the enlarged glands in the neck were not modified. The man is now taking a course of Roentgen treatment for them, but his condition is precarious.

Emil Mayer.

Black Tongue and Keratochromoglossitis.

LEBAR,

Ann. de dermat. et syph., Paris, 1917—July.

The writer has made numerous histologic studies of this affection with a special technic. It is an easy matter to snip off the papillary filaments and tease them out in water, clear them with immersion in potassium hydrate, etc. Viewed at low power they present no black granulations of pigment such as one would expect to see. In fact, the epithelium, hypertrophied and keratinized, does not differ essentially from that of the ordinary sabunal tongue, the habitually loaded or coated tongue. Blevgad, a Swedish investigator, arrived at the same conclusion. Under the microscope the only distinguishing mark is the greater length of the papillæ in black tongue, while the keratinization which is so well developed in the latter does not at first sight account for the black color. The use of solvents of all kinds fails to extract any coloring matter, and the blackness cannot be due to blood pigment, iron or other familiar substance. The author studied especially a patch of black tongue on a pneumonia patient, the death of whom allowed him to obtain an autopsy specimen. The histologic study was made by Professor Darier. A second specimen from a dead tuberculous patient was studied under a different technic. Inoculation tests remained negative throughout and, generally speaking, the parasitic theory,

like the pigmentation theory, is without support. The affection consists of two essential features, viz.: Elongation of the filiform papillæ with abnormal coloration of their extremities. Prolonged study appears to show that the latter is not histologically essential, or in other words black is only the extreme shade, other papillæ showing all nuances of color from black to brown, coffee and milk, pale, etc., as in ordinary hairs the shade of color is not apparent under the microscope. The changes in the mucosa indicate the presence of a glossitis, and this, with the tendency to form keratin, causes the author to coin the term *keratochromoglossitis*, of which black tongue and habitually coated tongue form two clinical varieties. Among the causes of this condition are local processes in the mouth, pharynx and nasopharynx, gastric and pulmonary affections, etc. Irritating chemicals used as buccal antiseptics, such as menthol and potassium chlorid, are also able to determine these conditions. Smoking can hardly be regarded as an important factor, for out of Blevgad's seventy-three patients only sixteen were smokers, and the author found but five smokers among nineteen patients. In the individual case of black tongue there may have been staining of some sort involved, but any attempt to generalize from these isolated cases must be given up. Keratin has a faint yellow hue, even under the microscope, and since black tongue doubtless represents the extreme phase of keratinization this coloration must be due to certain optical properties belonging to this substance.

Emil Mayer.

Vincent's Angina.

DEGLOS.

Lyon méd., 1918—CXXVII—1.

The writer found twenty-one cases of ulceromembranous stomatitis, Vincent's angina, among two hundred and fifty-five men with sore throat sent to his contagious diseases hospital. The men were usually young, and the onset of the angina had been insidious, but in all there was a swollen and painful gland at the angle of the jaw on the same side, and all seemed depressed and pale. The reds usually numbered less than normal, down to 3,000,000, the whites about 10,000. Bacterio-

logic examination is indispensable. The "fusospirillar" symbiosis was pure in all his cases. Good results were realized by repeated application of a ten per cent solution of methylene blue after clearing out the contents of the ulcer and swabbing with a solution of silver nitrate. In certain rebellious cases a single intravenous injection of neosalvarsan, 0.3 gram, in two or three cubic centimeters of double distilled water, led to the almost complete healing of quite deep ulcerations in from four to six days. A second injection four days after the first was followed by complete recovery in eight or nine days. Otherwise the stomatitis lasted up to several weeks in some cases, notwithstanding vigorous local treatment. *Emil Mayer.*

Improved Mouth Gag and Tongue Depressor.

MOYER, J. J., Oakland, California,

J. Am. M. Ass., Chicago, 1918—LXX—680.

This invention relates to improvements in mouth specula, and more particularly to an improved tongue depressor. Its object is to provide a tongue depressor which is instantaneously removable from the mouth gag. This tongue depressor may be adjusted for depth to suit the mouth, and has an oscillatory mounting, leaving the operator free to move the tongue depressor from side to side without affecting the adjustment of the gag or removing the depressor from its holding means. *Emil Mayer.*

Relation of Streptococci to Bovine Mastitis and Septic Sore Throat.

DAVIS, D. J., Chicago,

Am. J. Pub. Health, Boston, 1918—VIII—1.

The question of pasteurization is an interesting one in relation to these infections. In the case of several epidemics in this country, the writer says that the infected milk had been pasteurized by the "flash" method, and the evidence in all indicated quite clearly that the milk was contaminated before pasteurization. Therefore the "flash" method is inefficient. The harm it may do by giving people a sense of false security is also self-evident. In certain epidemics the milk was consumed raw. It would seem that the only safeguard against

such epidemics is efficient pasteurization, not only of the milk and cream, but also of the material entering into the manufacture of other milk products. It is a point of some importance that it is not uncommon for firms to sell pasteurized milk yet to sell cream in the raw state. The latter is even more dangerous than milk. The question as to what constitutes efficient pasteurization for streptococci is one that requires further study. It is commonly stated in the literature that pathogenic streptococci are killed at relatively low temperatures (52-54 C. for ten minutes, Sternberg). Undoubtedly for many strains this is altogether too low. The recent work of Ayres and Johnson indicated that the thermal death point of typical streptococci varies considerably, and one of twenty-two strains studied by them resisted heating for thirty minutes at 62.8 C. (145 F.), the usual temperature for pasteurization. Furthermore, their viability in milk and milk products should be carefully studied, since we know that media may exert an important effect on the resistance of organisms to heat. In the writer's work, in which ninety-eight strains of streptococci were tested, none of twenty-four pathogenic hemolytic streptococci of human origin resisted 60 C. (140 F.) for thirty minutes. Twenty of seventy-four strains of hemolytic streptococci of milk origin and having practically no virulence, resisted 68.3 C. (155 F.) for thirty minutes. The writer knows of no evidence to indicate that strains of streptococci pathogenic to man can resist the usual temperature for pasteurization (145 F. for thirty minutes).

Emil Mayer.

A Case of Accessory Tonsils.

HAGEMANN, J. A.,

Laryngoscope, St. Louis, 1917—XXVII—906.

Several weeks after a normal tonsillectomy, the patient again complaining of a sore throat, an examination revealed curvilinear fissures about five-sixteenths of an inch in length on either side of the soft palate and ranging even with the anterior pillars. A curved probe with a little manipulation disclosed the presence of a tonsillar mass about the size of a

pea in each cavity. After removal an unmistakable cavity, entirely separate from the tonsillar fossa, was in evidence.

The presence of these supplementary tonsils is of interest chiefly from an embryologic standpoint. *Arthur I. Weil.*

Stenosis of the Nasopharynx—Operation With Prosthesis.

ISAACS, H. E.,

Laryngoscope, St. Louis, 1917—XXVII—885.

The method employed to maintain the opening was by means of an appliance consisting of a pair of wire spring holders, fitted to the molar teeth on each side of the upper jaw, and joined by a bar fitting into the arch of the palate; from this bar two wires run back to the nasopharynx and support a vulcanized rubber tube, made into a form conceived to be that which the operative opening would measure. *Otto M. Rott.*

Salivary Calculus.

CARTER, W. W., New York,

Laryngoscope, St. Louis, 1917—XXVII—881.

The author details his own case and advises operation through the floor of the mouth, unless there is an external fistula or an abscess of the gland.

The technic employed in the author's case was as follows:

1. Morphin, grain $\frac{1}{4}$, atropin, grain $\frac{1}{150}$, hypodermatically.
2. Area cocainized, superficially and deeply.
3. Patient lying on affected side with tongue protruded to opposite side.
4. Locate stone by bidigital palpation and have patient push gland forward and upward by placing thumb under angle of the jaw.
5. Tissues are fixed by means of a pair of forceps, and an incision is made down to the stone, which is then grasped with forceps and removed. Care should be taken not to injure the lingual nerve, the maxillary artery, or the facial artery.
6. Wound should be left open and frequently irrigated.

Otto M. Rott.

The Fossa of Rosenmueller From the Rhinologic Standpoint.

YANKAUER, S., New York,

Laryngoscope, St. Louis, 1917—XXVII, 861.

In the minds of most of us, disease in the fossa of Rosenmueller has been associated with ear symptoms alone, yet a study of the anatomy and physiology of this region makes it clear that the ear symptoms are often secondary to disturbance of nasal function caused by pathologic changes in this region.

The fossa is nearly an inch in depth, extending from the posterior tip of the eustachian eminence to the postpharyngeal wall, and part of the inspired air, on its way through the nasopharynx passes through this gutter. When this passage is closed by adhesions there is considerable respiratory obstruction, even if the adenoid has been removed or atrophied. This condition is cured by cutting the adhesions.

The presence of secretion in the fossa of Rosenmueller is of interest also to the rhinologist as well as to the otologist. Anteriorly the fossa is limited by the salpingonasal fold, a fold of mucous membrane which extends upward from the tubal eminence to the vault of the nasopharynx. When secretion is present in front of this fold it is, in the opinion of the author, sufficiently characteristic of disease in one of the posterior nasal sinuses as to warrant operation on the sinus, even when all other symptoms are lacking.

When the secretion is behind the salpingonasal fold it has not the same significance, especially if there are adhesions between the posterior lip and the postpharyngeal wall. In this case the fossa may be converted into a pocket in which secretions may accumulate, giving rise to a foul taste or odor and simulating sometimes sinus disease which is really not present. In these cases the symptoms clear up when the adhesions are removed.

The author is not prepared to say whether these dammed up secretions are sufficiently confined to act as a focus of systemic infection, but he suggests such a possibility.

He also mentions a case in which reflex cough was cured by cutting the adhesions of the fossa, and suggests that this

may be another of the many points of origin of nasal and laryngeal reflex neuroses.

Arthur I. Weil.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Acute Laryngitis With Edema of the Glottis—Report of Three Cases Requiring Intubation—Recovery.

FISCHER, LOUIS, New York,

Med. Rec., N. Y., 1918—March 30.

From a study of the three cases here described, we find all presented the same class of symptoms—rhinitis and catarrhal manifestations of the nasopharyngeal tract several days prior to the acute laryngeal stenosis. There was fever in all cases. The temperature ranged between 102° and 105°; it invariably rose two degrees after antitoxin was administered. The pulse rate was accelerated and rose from 110 to 140 in several cases. The respirations were labored and the frequency was double that of the normal child. These catarrhal symptoms were associated with a barking, rasping, or croupy cough, and in several cases with marked respiratory interference. The cyanosis of the lips and face was also manifest in the hands and fingers—a distinct circulatory disturbance. There were also marked retraction of the chest walls, overacting intercostal muscles, and accelerated and difficult breathing. The retraction at the ensiform cartilage and at the epigastrium was distressing at each inspiration.

Deductions from the symptoms just mentioned would indicate that a stenosis of the larynx was present. On palpation the epiglottis was found swollen, the larynx was thickened, hardened and infiltrated, and it was with considerable difficulty that an intubation tube adapted for the age was introduced. Such tube usually remained in the larynx two or three weeks, and was then coughed up. In one case the tube remained but four hours. In another case the child coughed up and swallowed tubes twice in one week.

Several points should be remembered in the management of laryngeal edema. Be careful not to force a tube into the larynx, even though the size may be suited to the child's age.

All cases should be given sufficient antitoxin. Do not expect

a laryngeal stenosis to improve by giving less than 5,000 to 10,000 units of antitoxin.

A laryngeal spray of 1/2,000 adrenalin chlorid, or a local application of adrenalin by means of a swab, several times a day, has a very soothing effect. One-grain doses of sodium iodid will relieve and reduce the swelling in the larynx. If the child is very anemic, five to ten drop doses of syrup of iodid of iron, three times a day after meals, is a good restorative and should be tried.

The after-treatment consisted in giving one-grain doses of thyroid extract, three times a day, for one week. This thyroid extract was given to stimulate the internal secretions and to supply the supposed deficiency of thyroid. This was followed by Basham's mixture, one dram, three times a day, after meals. To stimulate the circulation tepid tub baths followed by cold spray or shower and massage, were ordered daily. The bath and shower were given to stimulate the circulation and as a vasomotor tonic. Excellent results followed this plan of treatment, both as to the circulation and as a general restorative.

Emil Mayer.

Paralysis of Recurrent Laryngeal Nerve Associated With Stenosis.

BROWN, GEORGE E., AND HEMPSTEAD, BERT E., Miles City,
Montana,

J. Am. Med. Ass., Chicago, 1918—LXX—4.

This was a case of mitral stenosis, associated with temporary paralysis of the left recurrent nerve, during a period of mild decompensation, in which, under appropriate treatment, the left auricle decreased in size. This reduction in the size of the auricular chamber evidently released a pressure on the left recurrent nerve with restoration of its function. The case is the only one of this particular type that we have been able to find in which a diagnosis could be made early enough to allow the nerve function to return. The case illustrates the importance of a rigid investigation of every case of left laryngeal paralysis to rule out its more common causes, as no other etiology offers a better chance of relief than this particular type.

Emil Mayer.

Esophagoscopy and Tracheobronchoscopy.

FORERO, A.,

Report. de Med. y Cirug., Bogotá, 1917—IX—1.

The writer gives the history of endoscopy and the preferable technic, remarking that general anesthesia is indispensable for children, as they are restless and cannot stand cocaine; also for timid adults and in all cases in which the foreign body has induced an inflammatory reaction. Otherwise he prefers cocaine alone. The loss of flexibility in the spine with advanced age renders endoscopy much more difficult, although not contraindicating it absolutely, but cachexia is an absolute contraindication, and extreme caution is indispensable with heart disease, aneurysm, pulmonary tuberculosis, emphysema, etc., and also extreme nervousness not moderated with sedatives. With cancer of the esophagus there is often spasmodic constriction above. He deplores that with foreign bodies in the air passages and esophagus there is usually so much delay before applying to the endoscopist that the difficulty of detecting and removing the foreign body is much enhanced by the resulting inflammatory reaction. The article is illustrated.

*Emil Mayer.***Laryngotomy in Children.**

MCCAW, JAMES F., Watertown, N. Y.,

N. York State J. M., XVIII—1918, January.

The writer reaches the following conclusions:

First—That under certain circumstances laryngotomy becomes necessary and justifiable in children. These circumstances may vary, but may be just as imperative as in the above recorded case.

Second—Although the preoperative and postoperative care is most exacting and difficult of carrying out, the mortality higher than in the direct method, this should not deter us from doing our duty when occasion demands it.

Third—The writer is not prepared to say that the functional results from the direct method are much better than a carefully performed thyrotomy.

Fourth—The arguments against it are the high mortality, the presence of an external scar, and the prolonged and exacting postoperative care, but even these should not mitigate against it where necessity demands it. *Emil Mayer.*

A Case of Blastomycosis With Laryngeal Involvement.

DOWNING, E. D., Woodmen, Colo.,

J. Am. Med. Ass., Chicago—1918—LXII—85.

Male, aged thirty-seven years. There was a marked hoarseness, with pain at times in the ear. On the right tonsil were two small pinpoint yellowish spots. The epiglottis was eroded in a V-shaped ulceration, the lesion extending well on the tongue. It was not swollen, enlarged or juicy, as seen in tuberculosis. The entire mucous membrane of the larynx and the cords looked as if they had been treated with silver nitrate. Closer inspection revealed many small, slightly elevated pinpoint yellow spots. There was not the appearance of extensive infiltration that is seen in tuberculous laryngitis with the same amount of involvement. A diagnosis of blastomycosis was made, and confirmed by William Ophuls in the following report:

"Sections show marked inflammatory infiltration of connective tissue and considerable proliferation of the surface epithelium. In the proliferated epithelium, several microscopic abscesses. In the inflamed connective tissue, many large multinuclear giant cells of Langhans type. In the latter and in abscesses many small spherical, budding, encapsulated parasites. Blastomycosis of larynx."

The patient was given large doses of potassium iodid daily, and his throat treated with tincture of iodine every third day. He gained a few pounds in weight, and his temperature remained about normal; but the laryngeal lesion gradually narrowed the space in the larynx to a mere slit. In February, while eating supper, he choked up. Laryngeal examination revealed both cords in contact. Very little air was entering the lungs. A tracheotomy was performed at once.

A roentgenogram at this time disclosed considerable lung involvement. Physical examination revealed an increase of dullness on the left side. Six cubic centimeters of "cyano-

cuprol," kindly furnished by Dr. Koga, were given intravenously once a week during April and May.

The temperature ran from 98.6 to 99.5 degrees, and mimicked an early tuberculosis. The patient was discharged June 2, 1917, as his condition was hopeless. The dullness in both lungs was now quite marked, but evidence of moisture was still indefinite. The roentgenogram taken at this time disclosed extensive lung involvement.

The patient returned home. The lesion in his throat finally prevented him from swallowing, and he had to be fed by a tube. He died in October, 1917. A necropsy could not be obtained.

Emil Mayer.

Laryngeal Stenosis as a Complication of Measles.

MORRIS, M. FORD,

N. York M. J., 1917—December 15.

The writer calls most decided attention to laryngeal stenosis as a complication of measles which requires vigorous and quick attention. The symptoms are those of croupy cough, increasing dyspnea and pallor, and retraction of the epigastrium and lower intercostal spaces. A membrane may or may not be visible. It will be seen that these symptoms closely resemble those of laryngeal diphtheria. His experience with these cases has been gathered from the wards of the Willard Parker Hospital, and some of these patients enter the hospital with nose and throat cultures negative for bacillus diphtheria, while others have positive cultures; some react to the Schick intradermic test, while others do not. Morris quotes Parke, of the Department of Health Research Laboratory, as stating that "positive cultures of a diphtheroid organism and a diphtheritic looking membrane do not necessarily mean that the case is diphtheria," and also that he "does not believe that diphtheria ever occurs in a person who has a negative Schick." If the diphtheria bacillus does not cause this laryngeal condition, either the streptococcus or staphylococcus is the "root of the evil." He considers this condition of laryngeal stenosis a too frequent and a very serious complication of measles and that the onset of a croupy cough should be the signal for vigorous treatment. Intubation should be tried, even though it failed to relieve in the cases cited above.

Large doses of diphtheria antitoxin—15,000 to 30,000 units—should be given, in the writer's opinion, even in cases with a negative Schick, and in the latter cases, for the purpose of satisfaction of conscience, if nothing else. If a positive blood culture of the streptococcus or staphylococcus can be obtained, vaccine therapy, preferably autogenous, will be logical.

Emil Mayer.

Sublingual Medication.

ROBINSON, BEVERLEY, New York,

Med. Rec., N. Y., 1917—December 29.

If the hypodermic syringe be used without every precaution being employed, syphilis may be disseminated far and wide to those previously free from it, and possibly tetanus, tuberculosis, or some other fateful disease. To be entirely safe the hypodermic syringe must be sterilized, water boiled, or when used, already distilled, and the skin of the patient thoroughly cleansed with alcohol or ether.

All this takes time and implies conditions which are not available on the fighting line. It must also be remembered that on one or more occasions in practice, hypodermic injections should be repeated. How much simpler and more practical it is to order the nurse or patient to make use of a hypodermic tablet under the tongue, rather than to be forced in time of great emergency to call upon the physician to give the relief imperatively required. Here we find the great value of sublingual medication.

A small hypodermic tablet is simply powdered on paper with a penknife and poured behind the front teeth and under the tongue. In a few moments it is completely dissolved and absorbed, and very rapidly the constitutional effects of the drug employed are observed. If there be great pain, it is almost magically relieved.

Emil Mayer.

Speech Correction: A New Medical Study and a New Educational Movement.

SWIFT, WALTER B.,

Boston M. & S. J., 1917—December 6.

The writer gives a brief account of the work done under his supervision in the advancement of speech improvement,

or correction, in the laryngologic department of the Harvard Graduate School of Medicine. He has conducted graduate and undergraduate courses, and the work has been arranged under four heads: Medical, psychologic, treatment and educational. The medical courses consist in medical instruction, with special reference to speech. For example, it is shown how enlarged tonsils interfere with early speech development, how cleft palate makes speech indistinct, and how paralysis of the tongue muscles makes certain utterances impossible. The courses dealing with the psychologic aspect take up the mental functions related to speech, considering their origins and the relations of eye and ear registrations of psychologic interpretative processes and mental collaboration. Under the treatment aspect the courses take the eradication of speech defects. The courses dealing with the educational aspect cover the relationship of speech disorder to the public schools. The educational aspect includes the training of the speech nurse. He further states that the more immediate aims of the two speech clinics in Boston are, first, to show teachers how to correct speech disorder in the public schools; second, to found other speech clinics under other medical heads; third, to establish other teaching centers as affiliated branches of the original home clinics. These Boston clinics are dominated by the research problem. Every student is given an investigation. This accounts for the extraordinary productivity of the two clinics during the last few years. During last year about one hundred and twenty papers were read by Swift and his assistants, and during the year before that one hundred and ten. Yet they state that they have done nothing that others could not have done with the same training and opportunities. He tells that last year one hundred and three teachers studied the methods and systems of the clinics, and now these methods are being put into practice in the public school systems of the various cities, and classes will be formed for the correction of speech disorder under medical supervision. Physicians who have studied in these clinics have later established clinics of their own, affiliated with the home clinics, with aims of mutual aid. In carrying out the clinical method the patient's history is taken in the ordinary way, and he is given a thorough examination—physical, mental, psychiatric, psycho-

logic, and educational—before the more exhaustive examination of the functions of his speech mechanism. Then treatment is outlined and he is drilled individually or in a class. At the same time he is fitted into an investigation, and a minutely detailed record of progress is put down as data for some future use.

Emil Mayer.

Stricture of Esophagus—Successfully Dilated From Below Upward Through Gastrotomy Opening.

ROBINSON, E. F., Kansas City,

J. Missouri M. Ass., St. Louis, 1918—XV—1.

For twenty years no solid food entered the stomach of the writer's patient and liquids only in the smallest quantities. Since birth this girl had never been able to swallow solid food. Ever since she could remember, when she would eat, the meal would be vomited about four to six hours later. For the past few months even milk would be ejected from the esophageal pouch, usually in a hard curd. A roentgenogram and the fluoroscope, after a glass of bismuth and buttermilk, showed a large esophageal pouch about two inches above the diaphragm. A faint fine shadow about the size of a small knitting needle could be traced indistinctly through a stricture into the stomach. An effort was made to pass the stricture by having her swallow fine silk threads. In order to get these down they were attached to small pieces of easily dissolved chocolate cream candy, but no success resulted from these efforts. Under ether anesthesia the abdomen was opened by a vertical incision about one inch to the left of the median line. The stomach, which was very small, was brought into the wound and an incision just large enough to admit the index finger was made low down on the anterior surface. After locating the esophageal orifice a small bougie was passed with difficulty through it up into the pouch and out through the mouth. To the bougie was attached a heavy linen thread, which was drawn out of the gastrotomy opening. A heavier silk thread was tied to this and then a double piece of obstetric tape. There was thus established two heavy ligatures through the gastrotomy opening, through the stricture, and out the mouth. The end of one of these were tied together to serve

as a safety ligature. To the other was attached a rubber drainage tube which was pulled through the stricture and the end allowed to protrude from the stomach opening. Several holes were cut in the tube to permit feeding through it. The stomach was attached to the abdominal wound and the tube was invaginated to prevent leakage from the stomach. The patient was fed through the tube for the first three days, and when the tube was removed, liquids and soft food were given by the mouth. The gastrotomy closed in ten days. The emergency or safety ligature was not removed until the tenth day, when bougies were passed by the mouth. These were continued each week for some time. Three months after operation the girl had gained thirty pounds in weight. *Emil Mayer.*

Intubation in Laryngeal Diphtheria, With Notes on Sixty-four Cases.

SHEFFIELD, HERMAN B., New York,

Med. Rec., N. Y., 1917—December 22.

The writer records intubating sixty-four children suffering from laryngeal diphtheria, with but one fatal issue. This favorable result was due to the facts, firstly, that the physicians in attendance had promptly administered ample doses of antitoxin to neutralize the diphtheritic toxin; and secondly, that they used the good judgment of inviting me to perform the operation while their patients were still in fair vitality, and not gasping for the last breath of air, as is often the case with those sent to hospitals for contagious diseases. It may be noted that all of these children remained in their own homes, often in most undesirable surroundings, and without skillful nursing. Four of them lived out of town, requiring two or three hours' journey to reach. In but one instance he was obliged to reintubate three times, and the case failed to show diphtheria bacilli after repeated laboratory examinations. In these cases, which are generally spoken of as "retained intubation tubes," we usually remedy the trouble by gradually introducing larger tubes with each reintubation and by local attention to the nose and throat. *Emil Mayer.*

Treatment of Painful Dysphagia in Tuberculous Laryngitis.

LUKENS, ROBERT McD.,

N. York Med. J., 1918—February 23.

The writer discusses this subject with special reference to nerve blocking. He says that in all cases of painful dysphagia the internal laryngeal nerve should be blocked. There are no contraindications to nerve blocking, and this procedure aids the dietetic treatment by removing or lessening dysphagia sufficiently to allow the patient to eat necessary food. More rest is obtained, due to cessation of pain from the throat, and any number of injections may be made and the patient kept in constant comfort by injecting as soon as the pain occurs. Histologic examinations of injected nerves showed that the results modified the nerve trunk very little, fibrosis being usually present, and in some cases numerous spaces within the bundles of the nerve fibers. He urges the wider use of this method of treating painful dysphagia in tuberculous ulceration of the larynx, as it is a procedure which can be learned easily and practiced by the average practitioner. *Emil Mayer.*

Death From Pressure on Larynx by Extreme Anterior Curvature of Cervical Spine.

NOEHREN, ALFRED H., Buffalo, N. Y.,

J. Am. Med. Ass., Chicago, 1918—LXX—680.

Female, aged sixty-six years, for twenty years had been in fairly good health, except that she had experienced constant difficulty in swallowing. Thus she had been unable to eat her oatmeal without picking out any lumps that might be in it. She had also been markedly hunchbacked ever since she had been in the institution.

The writer saw her for the first time, the morning of January 5, 1918. During the two previous days her difficulty in swallowing had markedly increased, and for twelve hours she had been unable to swallow anything.

Only a very superficial examination was possible, as the patient was in great distress, and could not breathe except when curled up on her left side. The most obvious symptom

was her extreme dyspnea, not a rapid breathing as in pneumonia, but a labored and rather slow breathing, as though there were some obstruction in the respiratory tract.

Postmortem examination revealed the cause of the dyspnea and dysphagia. The marked kyphosis in the dorsal region caused a compensatory lordosis in the lumbar and cervical regions, the most anterior portion of the latter consisting of the third and fourth cervical vertebræ. This anterior curvature came forward directly above the larynx and the opening of the esophagus, and pressed the epiglottis down on both of them, thus practically shutting them off. It occupied so much of the usual pharyngeal space that when the finger was introduced into the mouth it felt like a large osteoma filling the mouth and pharynx.

Emil Mayer.

Luminous Radiations in the Treatment of Laryngeal Disease.

Heliotherapy and Phototherapy.

SAUPIQUET,

Rev. de laryngol. etc., Par, 1916—April 15.

The article is an exhaustive one of the physics and method of employment of natural and artificial light in the treatment of laryngeal tuberculosis. The two methods of treatment are not antagonistic to one another but supplementary. The caloric rays are not therapeutically of value. Indeed, their employment may do harm.

In phototherapy we seek to suppress by the employment of appropriate filters rays of weak intensity, using only luminous rays and the ordinary ultraviolet. The "medium" and "extreme" ultraviolet rays do not penetrate the skin and are wont only to produce painful reactions. The rays of the spectrum which he makes use of both in heliotherapy and phototherapy are the rays of the "medium" portion of the spectrum, the caloric rays at one end and the ultraviolet rays at the other being cut off.

The choice of rays employed, whether heliotherapy or phototherapy, will depend largely upon the locality and requirements of the patient. Where not possible to employ the sun's rays regularly, phototherapy can be substituted. The great advantage of heliotherapy is that the patient can apply it

himself. For phototherapy the arc light is recommended with a water cooler and a quartz lens. Daily treatment of ten minutes is the usual procedure. For heliotherapy the indirect method by means of a laryngeal mirror of glass or quartz and a concave mirror of about thirty-five centimeters focal distance, suitably mounted on a base, is the simplest and best for the patient to use. Any hour in the day which best suits the convenience of the patient can be employed for the treatment. This will depend naturally upon the situation of the room and upon the condition of the sun.

Following this technic the author has been able in a great majority of his cases to obtain remarkable success. Even when a cure was not effected there has always been an amelioration of the symptom, such as cough, tickling, difficulty in swallowing, etc. It is advisable to make a preliminary application of adrenalin chlorid in order to avoid any vasodilatation which may be produced by the caloric rays, and it must not be lost sight of that undue reaction may take place.

Harris.

Four Cases of Intubation of the Esophagus by Means of Rubber Tubes.

GUISEZ, Paris.

Rev. de laryngol., 1917—June 15.

Guisez in this article makes one of the most radical contributions to the stenosis of the esophagus that has appeared in recent times. The plan of the intubation as set forth by him is to use a short tube of such form and composition as can remain exactly in place and stay there for a considerable length of time, in that way permitting the patient to eat, otherwise impossible or almost impossible before. The new feature of the method consists in combining drainage and permanent rubber tube dilatation. The drains which the author makes use of measure from five to six centimeters in length and are of different caliber, graduated according to the Charriere system in thirds of a millimeter.

The middle portion of the drain is intended to be placed at the level of the stenosis. The upper extremity is shaped like an inverted funnel. The lower end of it contains a num-

ber of holes in the sides, placed in such a way that when the tube is introduced on the mandarin the caliber of the tube is diminished and takes the shape which permits it to glide through the stenosis without any effort.

In order to avoid the stasis which gives rise to the consecutive inflammation of the mucosa, it is wise, wherever there exists a concomitant esophagitis, to practice regular lavage of the dilatation above the stenosis. Intubation is contra-indicated in all cases where acute esophagitis exists. An esophagoscopy examination must be made to determine the exact situation and caliber of the stenosis to be treated. The throat is anesthetized with a twenty per cent solution of cocaine. The esophagoscopy tube should be of the proper length, short as possible, but sufficiently long to reach the seat of the stenosis. It ought to be quite large, at least fourteen millimeters in caliber, for a man, and thirteen for a woman, in order that the drain may slip into it easily.

The all-important condition for the employment of intubation is the existence of some opening in the esophageal lumen. Gradual dilatation of the stricture is to be practiced. It is a good idea to allow a bougie to remain in several hours. In this way it will be possible to finally pass a No. 20 bougie. This is left in for four to five minutes. A No. 10 drainage tube, a size below, is then selected. After having lubricated it with oil, it is thrown upon the whalebone by means of a thread of silk or catgut. One is then ready for intubation. Its introduction is very easy. A filiform bougie is then introduced to ascertain that the drain is not bent. The passage of gas or liquids from the stomach will also show that it is in proper condition. The introduction requires but a few minutes. The patient begins to drink milk and bouillon at once, and where deglutition was almost impossible he is able to swallow immediately sufficient quantity for the support of his strength.

Five or six days afterwards the drain is replaced by a larger one, and so progressively No. 28 or 30 is attained. From this time alimentation can be a little more solid, vegetables in puree and soups pass easily. A veritable resurrection of the patient takes place. He puts on weight so that many of Guisez's patients suffering with epithelioma have taken on two to three kilograms in eight days.

The statistics of his results are particularly interesting. The first rubber tube intubation was performed in September, 1913. In all he has treated forty cases of stenosis of the esophagus by this method. Twenty-eight of the cases suffered from epithelioma of the esophagus. In five of them the stenosis was complete. In one of the cases gastrostomy had been performed and radium had been applied preceding the intubation. In thirteen of the cases intubation was the only form of treatment.

Five of the cases are dead. The others are still alive and are intubated at intervals of from one to eight months. The improvement in these has been so great that, if the diagnosis of cancer of the esophagus had not been made by actual examination, followed by the microscopic findings, it would seem that the diagnosis was faulty. Five of the cases were those of cicatricial stenosis due to the swallowing of caustics. Six other cases were simply inflammatory stenosis of the region of the cardia.

The author is with reason very enthusiastic over the method and records, especially in cases of cancer of the esophagus. He explains the tolerance with which the tubes are borne to be due to their elastic resistance and to their form. Their remaining in place is explained also by their shape. Occasionally, in cases of cicatricial and inflammatory stenosis, as a result of the dilatation, the tubes may fall lower in the esophagus. It is only necessary then to draw them up a little. They rarely come out of the mouth. Occasionally, the patient will attempt to swallow food which is too large and in that way plug up the tube. By simple lavage it can be cleaned out if necessary with the aid of the esophagoscope. Recently the author has made use of the drainage tube for the application of radium. The author finally urges it as superior to gastrostomy, which he regards by no means a simple operation.

Thos. J. Harris.

A New Procedure for the Cure of Cicatricial Stenosis of the Larynx, With Report of One Case.

JACQUES,

Rev. de laryngol., etc., Paris, 1915—XXXVI—193.

The patient was a young woman who had an almost com-

plete adhesion of the soft palate to the posterior wall. The posterior pillars were lacking. To the right of the uvula a small opening existed, which permitted the introduction of a moderate sized sound. A little air could be inspired, no air expired.

For the correction, the author, after local anesthesia, introduced the galvanic cautery knife, raised to red heat, into the supratonsillar fossa on the left side, and carried it through the thick fibrous cushion into the cavity behind. A suitably curved probe, threaded with a strong linen thread, was then introduced through the opening made, and brought out through the narrow passage existing. To this was attached a rubber tube three millimeters in diameter, which was tied in the orifice and allowed to remain for a month. At the end of that time it was removed, and a permanent epidermized passage was found to exist. Through this a wire attached to an electric tonsillotome was introduced, and the tissue gradually cut through.

No reaction took place and a permanent opening was secured. The patient for three or four weeks was instructed to rub the operated surface with a glycerated tampon. At the end of a month the cicatrix was complete. The function of the nose and ear were decidedly improved.

In cases of complete stenosis, instead of an incomplete stenosis, as existed in this case, the author recommends the making of two passages into the cavity behind, and then introducing the rubber tube. He advises, also, carrying in through the nose a sound to serve as a guide to show how deeply the cautery knife should be introduced. This usually is from ten to fifteen millimeters.

Thos. J. Harris.

Foreign Body, Piece of Bone, Wedged in the Trachea for Two Months—Removal by the External Route.

MOURE, E. J.,

Rev. de laryngol., etc., Paris, 1915—XXXVI—December 31.

Moure was able to get a clear view of the bone by the direct method, but was unable to dislodge it in spite of the exercise of considerable force. He accordingly did a tracheotomy and removed it through the tracheal wound.

The author calls attention to the remarkable fact that a piece of bone could remain in situ in the trachea for two months without giving rise to any symptoms of discomfort, much less interference with breathing, etc. This is to be explained partly by the fact that there existed an atrophic rhinitis which had extended to the trachea and made the tactile sensibility much less. The situation of the foreign body in the center explains the absence of symptoms of discomfort in breathing, etc. The form with its sharp angles accounts for its firm implantation and the inability to grasp it successfully endolaryngeally. It was, then, one of the cases where, in the author's opinion, the direct method was not applicable.

Thos. J. Harris.

Technic of the Application of Heliotherapy to the Larynx.

COLLET,

Rev. hebdomadaire de laryngologie, etc., Paris, 1915—XXXVI—221.

Ten years ago this treatment was brought forward by Collet. Since, it has been taken up by many authors. It can be employed by the direct method, or by the indirect method, either with a single refraction of the solar rays which the author has named monocatotropic insulation, or with two refractions, which he calls dicatotropic.

Direct insulation, whether through the skin or through the laryngofistula, manifestly does not enter into consideration. For the ordinary case, monocatotropic insulation is to be recommended. This can be practiced by the patient himself with an ordinary laryngoscope.

The author describes at some length a simple modification of a lounging chair which renders the employment of the method easy and practicable.

Which of the rays of the sun possess the desired healing power, is not definitely known. On that account it is desirable that they should all be conveyed to the larynx. Another question which has not been determined, is whether high altitudes with the pure air found there, alone permit of the successful application of the treatment, or whether in spite of the contaminations of the town or city, it can be successfully employed in the atmosphere of the city.

Thos. J. Harris.

V.—MISCELLANEOUS.

Salivary Calculus—Report of a Case.

CARTER, Wm. W., New York.

Laryngoscope, St. Louis, 1917—881.

This interesting case report is a recital of the author's personal experience. Two years ago he was seized with a sudden stinging pain on the right side of the tongue, accompanied later with swelling of the floor of the mouth in that side, the swelling increasing rapidly on taking food, and subsiding again a short time thereafter. A small calculus was discovered obstructing the mouth of Wharton's duct. The author removed this stone, about the size of a mustard seed, himself, under cocain. His symptoms promptly disappeared, and no further symptoms were noted until February 22, 1917, when a severe pain under the angle of the right jaw appeared. This pain was burning in character and radiated toward the tip of the tongue. The submaxillary gland on that side became swollen and exquisitely tender. Upon attempting to eat, the pain became almost unbearable, and the swelling beneath the jaw increased, extending down into the neck. Di-digital palpation disclosed a calculus below and opposite the last molar tooth. A radiograph of the area verified this observation, showing a large pear-shaped calculus and just below it two smaller ones.

On February 25th, under local anesthesia, Dr. A. J. Brown removed the stones through an incision in the floor of the mouth. The largest stone was about the size of a cherry pit, the smaller ones about mustard seed size. The recovery was uneventful, except for a sympathetic involvement of the opposite submaxillary and both of the sublingual glands, which incapacitated the patient for four or five days, during which time no food could be taken. The writer comments upon the difficulty of operating through the mobile tissues of the floor of the mouth, giving some valuable points in technic of assistance to both operator and patient. The pathology of salivary calculi is well given. The author closes with a plea for early removal of salivary calculi, to prevent pain and abscess formation, with possible cellulitis, which is so dreaded in this locality.

Jos. D. Heitger.

Data Obtained From the Observation of Five Hundred and Thirty-one Cases, With Reference to Etiology of Thyroid Hyperplasia.

EPLER, BLANCH W., Kalamazoo, Mich.,

J. Mich. M. Soc., Detroit, 1918—56.

This is a tabulated report of the examination of two thousand students of the physical education department of a normal school in Southern Michigan, in which it was noted that enlarged thyroids were present in about eighty-five per cent, the average age being nineteen years. The investigation considered the possible infectious nature, direct or indirect, of the thyroid hyperplasia. The majority of the students came from small towns and rural districts in Southern and Central Michigan, and the school conditions were thought to have no bearing upon the findings obtained.

In data obtained from five hundred girls, the character of the source of each water supply, living locality and birthplace, contagious diseases, especially tonsillitis, and a few other points are emphasized. In a series of two hundred and fifty children (boys and girls), observations were made for similar points. Too large a number of these children showed heart murmurs, the majority beginning scoliosis, and many dental caries and uncared for gums, though coming mostly from well to do families.

Among the diseases noted are contagious diseases in general: tonsillitis, enlarged glands, typhoid, diphtheria, nasal or sinus infection, pyorrhea, acute arthritis, anterior poliomyelitis and smallpox. Most of the cases had had some contagious disease—showed slight acne vulgaris and obstipation or constipation.

Students coming from other states rarely presented an enlarged thyroid and, in fact, a normal thyroid always led the author to ask from what state they came. *Jos. D. Heitger.*

Three Cases of Infection of the Upper Respiratory Tract With Staphylococcus Pyogenes Aureus, Presenting the Symptom-Complex of Acidosis.

GARDNER, L. W., Boston, Mass.,

Am. J. of M. Sc., Phila., 1918—March.

The cases are divided into two classes:

1. Uncommonly severe and frequent nasopharyngeal infections in adults which in some instances have been proved to be of influenza bacillus origin.

2. Infections in children in whom gastrointestinal symptoms have been so prominent as to divert attention from the respiratory tract.

This paper deals with the group of infections in children. There came to autopsy a small group of three cases which had shown the clinical picture of acidosis. As a result of a study of these cases the writer concludes that uncomplicated staphylococcus pyogenes aureus is capable of infecting the upper human respiratory tract with the production of severe local lesions.

In these three cases the reaction on the part of the body is not of the type usually associated with this organism—i. e., simple exudation in the immediate presence of the bacteria, but it rather resembles the general reactions seen in the acute exanthemata.

Remote reactions of this type are constant in all of these cases, and comprise changes characteristic of a severe toxemia. They occur in the lymphoid tissue in renal epithelium, in arterial walls and in the fatty tissues. Each of these lesions is associated with the production or formation of fat, and a large amount of fat is present as globules, free in the blood serum. In addition, the presence of a lipase formed in vitro by this strain of organism has been demonstrated.

Although it cannot be proved by morphologic study alone, it seems plausible to suppose that some direct relation exists between these disturbances of fat, metabolism and acetonuria.

Whether this peculiarity of reaction is due to some inherent quality of this particular strain of staphylococcus or whether it is a result of the anatomic distribution of the organism is uncertain.

That the former explanation is correct may be inferred from animal experimentation.

In the rabbit it has been possible to reproduce remote toxic reactions by means of inoculation in several different tissues, most notably the subcutaneous tissues, and the lungs, indirectly through the blood stream, with the aid of a local irritant and depression of the vagus.

These cases also illustrate the necessity for examination of the larynx, an organ often neglected by pathologists in the course of routine autopsies. This is especially important in children showing hyperplastic lymph nodes.

Emil Mayer.

Goiter.

WATSON, LEIGH F.,

N. York M. J., 1917—September 22.

The writer presents an analysis of one hundred and twenty-five cases of goiter, together with a note on the treatment. He finds that both nontoxic and toxic goiters occur later in life in nongoitrous localities than in sections where the disease is prevalent. In this group of one hundred and twenty-five patients the majority noticed increased symptoms of intoxication as the goiter became more chronic. Eighteen per cent of the mildly toxic patients become exophthalmic after an average period of five years. In exophthalmic goiter, forty-five per cent of the patients cured by quinin and urea injections gave a history of acute onset of symptoms, while fifty-four per cent had had goiter for some time previous to the exophthalmic symptoms, which were noticed at an average age of thirty-seven years. The average time elapsing before the disappearance of the goiter was five months. In toxic non-exophthalmic goiter those patients who were cured by quinin and urea injections noticed symptoms of intoxication 1.7 years before examination, at the average age of 33.5 years. The goiter disappeared within from one to twelve months, the average period being four months. The number of patients cured was highest in the group of these who came for treatment early in the disease: the portion to the degree of damage done the circulatory and nervous systems. A goiter which has disappeared under this treatment has never recurred. The majority of patients in this group were under observation for from two to four years. Quinine and urea injections were used in treating 100 of these patients; in the remaining twenty-five this treatment is not suited to all types of goiter, and unless used discreetly will be disappointing, if not disastrous. The treatment of the exophthalmic type in

young adults is most difficult, and should be attempted only under the most favorable circumstances. If the best results are to be secured hyperthyroidal patients must have at least a year of mental and physical rest after treatment.

Emil Mayer.

**Rapid Method for Identification and Isolation of Meningococci
From the Nasopharynx.**

OLITSKY, PETER K., New York.

J. Am. Med. Ass., Chicago, 1918—January 19.

There is no subject in practical bacteriology being more actively pursued than that of the identification of the meningococcus in plate cultures prepared from the nasopharyngeal mucous membrane. The method proposed employs a fluid medium which serves to eliminate other organisms resembling the meningococcus in about twelve hours and to reduce the full time required to identify the latter by at least one day.

1. The sparing of culture medium: hence more colonies from a given plate will or may be investigated.

2. The rapid growth of organisms in the small volume of medium, thus permitting the discrimination of negative and suspicious growth in about twelve hours.

3. The use of normal horse serum for enriching the medium and for the elimination of a variety of gram-negative micrococci that are subject to nonspecific agglutination. Among the latter is especially *M. flavus*.

4. The sharpness and rapidity of the reaction of agglutination produced by the polyvalent antimeningococcic serum with the meningococcus at the temperature of from 37 to 38 C., as employed in the usual agglutination tests with meningococci, is a great simplification, especially under conditions of army work.

5. The simultaneous yielding of pure cultures of meningococcus for stock or further study, provided all the steps have been conducted in a strictly sterile manner.

Emil Mayer.

**The Value of the Face Mask and Other Measures in Prevention of
Diphtheria, Meningitis, Pneumonia, Etc.**

WEAVER, GEORGE H., Chicago,

J. Am. Med. Ass., 1918—LXX—76.

In recent years so much emphasis has been laid on contact infection in contagious diseases that the possibility of infection through the air at short distances has been sometimes forgotten. Infection through the air for relatively short distances—that is, within a few feet of the patient (or carrier)—is quite possible in case the specific agent is present in the secretions of the nose and throat, when forcibly thrown out in small particles in forced expiratory efforts, as in coughing, crying or sneezing.

The masks used consist of a double thickness of gauze, so shaped as to fit closely over the face, from the chin well up over the nose, and held in place by two tapes tied behind the head. A mask is never worn twice until sterilized and washed, and is always replaced by a fresh one when evidently contaminated or when it becomes moist. Little objection is made to wearing the mask, and most nurses now wear them constantly when on duty. The attacks of tonsillitis, pharyngitis and rhinitis that were relatively frequent before the masks were used also have almost disappeared in the last year.

The physicians in the hospitals always wear the gauze masks when doing intubations and taking throat cultures, and to a considerable extent when examining patients. Coincident with this use of masks there has been an absence of diphtheria or diphtheria bacillus carriers among the physicians, and only a limited amount of throat infections.

We feel that great protective usefulness resides in this mechanical measure, and think that it might be used to advantage also by persons caring for pneumonia patients.

In hospitals caring for pneumonia and epidemic meningitis, especially in those that deal with epidemic outbreaks, such as occur in military camps, gauze masks might be used with advantage by all physicians, orderlies and nurses. The importance of carriers in these diseases is apparently very great, and that those about such patients become carriers quite fre-

quently is evident when not less than 12 per cent of carriers of meningococci were said to have occurred among the personnel of a hospital in which epidemic meningitis patients were treated. The mask not only protects the healthy person from infection and from becoming a carrier, but also prevents a carrier from spreading infection to others. Masks can be used to good advantage also in households in which are patients with diphtheria, pneumonia, scarlet fever, epidemic meningitis or other diseases spread by nasopharyngeal discharges.

Emil Mayer.

Recent Progress in Otorhinolaryngology.

DUFOURMENTEL, L.,

Paris méd.—VII—35—177.

Among the recent advances cited is mentioned the method of maintaining respiration and giving the anesthetic through a fine canula introduced directly into the larynx by puncturing the cricothyroid membrane. Operations on the face and neck can be done then as tranquilly as if remote from the respiratory apparatus. Intratracheal intubation answers the same purpose, but this requires more complicated instruments and irritates the vocal cords. Deafness is now classed as exempting from military service when loud speaking is heard only close to the ear. When loud speaking can be heard no farther than one meter, this compels acceptance only for the auxiliary military service; heard at four or five meters is the limit requirement for active service. Eleven different styles of tests for the hearing may be used. They include what is known as the cochleopalpebral reflex—that is, the involuntary winking when a sudden loud sound is heard close to the ear. This reveals simulation of deafness. The double tuning fork test is also instructive. Two tuning forks giving the same tone but with different intensity are placed at the same distance from each ear. With normal hearing the resulting unison is heard only on the side of the loudest tone. One tuning fork can be silenced to test the hearing. The simulator does not learn lip reading like the truly deaf. After a month of training he cannot read from the lips if a noise drowns what is being said. Another trick test is to tell the subject,

speaking from some little distance, to raise his hand when he hears the spoken word. Then the examiner, speaking some syllable over and over again, walks toward the subject. The simulator raises his hand as the examiner comes quite close, thus showing that he had heard the command at a distance. Lip reading seems to be the only means of relief for the truly deaf.

Emil Mayer.

Thyroidism After Roentgen Treatment—Two Cases.

VERNING, P.,

Hosp-tid. Kobenh., 1917—LX—31—741.

The writer reports two cases, with only a few weeks' interval, in which the vascular, recently developed goiter was given Roentgen treatment, and fatal thyroidism followed. One patient was a woman of twenty-six years. The symptoms of the exophthalmic goiter became manifest two months after delivery of her first child. She had always been nervous, and two years before had had febrile articular rheumatism, with complications on the part of the heart. The thyroid was exposed to the Roentgen ray, the dose 5 H., filtered, and the exposure was repeated the next day. The circumference of the neck subsided from $36\frac{1}{2}$ to $34\frac{1}{2}$ in a few days, but the tremor and agitation increased to actual delirium, and the woman died fifteen days after the last exposure, a little over two months after the first signs of the exophthalmic goiter. The other patient was a housemaid of eighteen, with no pathologic antecedents except one slight attack of gastric catarrh and chlorosis. For the last year she had been easily tired and nervous, with a tendency to occasional palpitations and shortness of breath. She entered the hospital a month after she noticed that her neck had begun to enlarge a little. Two Roentgen exposures were given, with the same dose as in the other case, only with a two-day interval. Symptoms of mild thyroidism developed, as the circumference of the neck became reduced from 34 to 30.5. Later the thyroid symptoms became aggravated, and the girl died about six weeks after the exposures. A mild intercurrent infectious sore throat may have been a factor in the fatal outcome. The dosage of the rays was not above the average, but must have been excessive

for such recently developed cases. The writer summarizes in conclusion the cases he has found on record in which, under Roentgen treatment, the symptoms became aggravated. As a rule, however, this aggravation was transient, and the result on the whole was improvement.

Emil Mayer.

Menstrual Epistaxis and Organotherapy.

BAB, H.,

München. med Wehnschr., 1917—November 6.

The writer in his first paper, in the first place recalls the facts already established by recent researches on the question of ovulation (eighteenth day), and the inhibitory action exercised by the corpus luteum on menstruation. He next shows the barrier set up against the normal menstrual flow by a hyperplastic or otherwise pathologic uterus. In these circumstances menstrual epistaxis assumes a compensative rôle. The localization of the deviation in the nasal mucosa is explained by the physiogenetic and functional relations which unite olfaction with the genital sphere. The writer develops his reasoning by resorting to numerous physiologic and clinical arguments which are too long to cite, but mention may be made of the fact reported by Fliess, namely, that dysmenorrhea can be relieved by the application of a solution of cocaine to the nasal mucosa.

Emil Mayer.

Status Lymphaticus—Death Following Tonsillectomy—Autopsy.

CARTER, WILLIAM WESLEY, New York,

Med. Rec., N. Y., 1918—January 5.

The writer reports this case because of the rarity of the disease, because of the uncertainty which surrounds its pathology, because of its grave significance in operative cases, and because the profession should be constantly reminded that there is such a condition as status lymphaticus, and that it is a menace which must be reckoned with by every operator. It is a danger, too, which, in the present state of our knowledge, cannot be forestalled and guarded against.

Emil Mayer.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOTOLOGY.

Meeting of January 11, 1918.

An Atypical Case of Otorrhea for Diagnosis.

BY JULIUS LEMPERT, M. D.

With the courtesy of this section, I was to report an atypical case of otorrhea for diagnosis, but while waiting for this opportunity certain changes in my patient's condition have taken place which necessitated my further intervention, thus revealing the possible cause of the condition.

History.—N. H., twenty-nine years old, came to me March 16, 1917, and gave the following history: For the last two years he suffered from attacks of excruciating pain in the left ear which could only be relieved by incision or natural rupture of the membrana tympani. This would be followed by discharge, which would last from twenty-four to forty-eight hours. These attacks would occur about every four to six weeks. Between attacks he would feel perfectly happy. His last attack was two weeks before coming to my office. Upon questioning him, he admitted to have had an otitis media purulenta chronica of the same ear about seven years ago, which would discharge at intervals for a period of about two years, without any pain of any kind except once during the onset of his otitis media purulenta acuta. At the end of two years the ear became perfectly dry and never troubled him until three years afterward, when he began to get the above describe attacks of excruciating pain, which have been going on ever since.

Examination revealed the following:

Left Ear.—Auditory canal perfectly dry. Membrana tympani of normal color but greatly retracted. No perforation visible. On testing his hearing I found that it was but slightly diminished, but not enough to attract patient's attention. The

drum membrane was not adherent; the slightest amount of inflation would bulge it outward. The eustachian tube on that side was patent.

Right Ear.—Everything normal.

Nose and Throat Examination.—Revealed a very marked deflection of his septum, hypertrophied tonsils and a chronic rhinopharyngitis.

Not having found a sufficient pathologic condition to account for patient's complaint, I decided to put him under observation and wait for an attack, meanwhile taking care of patient's rhinopharynx.

After ten months of observation, I will attempt to describe his condition as follows. He always went through the following three stages:

1. Onset.
2. Actual attack.
3. Period between attack and onset.

1. The onset began about one week before the actual attack.

Subjective Symptoms.—Fullness in the ear, increasing daily until actual attack would come, when it would reach its height.

Pathologic Findings.—Membrana tympani would begin to bulge outward gradually, and this bulging would increase from day to day until actual attack, when it would actually balloon out. The color of the membrane would change from its normal color to a dark gray and get darker from day to day until about two days before the attack, when it would be absolutely black. This change of color would not be in the membrane proper, but would be due to the color of the fluid in the middle ear, which would be pushing the membrane outward. The hearing would be slightly decreased from day to day, but it would never be decreased to a very great extent. No signs of inflammation present.

2. Actual Attack.—(1) Stage of pain. (2) Stage of discharge.

Stage of Pain.—Would always come on at night. Pain would be excruciating, cold perspiration from the forehead, and if the patient could not reach me quick enough he would get a chill and go into collapse. This pain once left without interference, lasted about eight hours, and then the membrane ruptured of its own accord. Temperature normal.

Pathologic Findings.—The tympanic membrane ballooning outward extremely, its color is absolutely black, due to the fluid behind it. No signs of inflammation present anywhere. The antrum and body of the mastoid are not tender. Hearing worse than at any time during onset, but not bad even now.

Stage of Discharge.—Which follows incision or natural rupture of tympanic membrane.

Subjective Symptoms.—Immediate and absolute relief of all pain. Patient would act as if nothing ever happened, which usually is not so with otitis media purulenta acuta.

Pathologic Findings.—On incising the membrane, one would observe that the membrane is extremely thin. Once the membrane ruptured from mere contact with a fine cotton applicator. A black discharge mixed with blood would come out under great pressure. The membrane would immediately collapse, the discharge would be copious but absolutely odorless.

Gross pathologic examination of discharge would reveal that it consists of blood and thick sticky mucus, black in color at first, then it becomes dark brown, then brown, and finally yellow. This discharge lasts from twenty-four to forty-eight hours and then the ear becomes perfectly dry.

Bacteriologic examination of discharge revealed a large amount of blood cells and a mixed infection with the staphylococcus prevailing.

The membrana tympani would remain open from twenty-four to forty-eight hours, then would close completely, leaving no trace of an incision or perforation. No tenderness over antrum or mastoid at any time.

3. Period between attack and onset, from three to four weeks' duration.

Subjective Symptoms.—None.

Pathologic Findings.—Canal dry. Tympanic membrane of normal color; no sign of incision or perforation. Membrane begins to retract and does so from day to day, until it reaches an extreme degree of retraction, and remains so until about one week before the attack, when the discharge in the middle ear begins to push it outward.

During a period of eight months of observation my patient had six attacks, always going through the same stages as described above. While observing him I also tried to do what-

ever I thought advisable to bring about a cure. I removed his tonsils under local anesthesia, then did a submucous resection. I treated his nasopharynx and his eustachian tube, but all without relief to my patient. Finally I decided to seek consultation. I brought my patient over to Dr. Robert Lewis, who after a very thorough examination told me that he was at a loss to make a diagnosis. He advised an X-ray examination of the mastoid region and suggested bringing the case before the otologic section of the Academy of Medicine for diagnosis. Dr. Dixon of the New York Eye and Ear Infirmary X-rayed my patient, and reported as follows:

"I have to report in the case of N. H., that he has a well developed, perfectly normal mastoid on the right side. The left shows a diploetic tip, sinus and postsinus region, and a sclerosed looking base. There is a very suggestive looking area one centimeter in diameter just below the knee.

"The anterior lip of the sinus cuts this in half. I am inclined to think that this is a soft spot in the bone and is very suggestive of perisinus abscess."

About three weeks after my consultation with Dr. Lewis patient had another attack, and following this, during a period of three weeks, he had two more attacks, all of them the same as described above. The canal was perfectly dry and membrane perfectly healed between each attack. The increase and frequency of the attacks suggested that it takes less time now for the fluid to fill up the middle ear. No signs of inflammation present, even then. Following this occurrence I reported to Dr. Lewis, who, together with Dr. Bacon and Dr. Dixon, spoke the case over and examined the X-ray plates and unanimously advised an exploratory mastoidectomy.

Patient was admitted into the New York Eye and Ear Infirmary December 28, 1917, and operated upon the 29th, Dr. Lewis being present at the time. The mastoid base was much sclerosed, the lateral sinus was very superficial and bulging, was exposed immediately upon removing the mastoid cortex, and ran very close to the posterior canal wall. No evidence of a perisinus abscess was found. Both sinus and dura were exposed. On exposing the antrum I found a bright red fibrous mass which did not bleed very readily. I removed this mass and gave it to Dr. Dixon for pathologic examination. The

antrum was thoroughly curetted, leaving no trace of the mass; the wound was packed and closed in the usual manner. I did a simple mastoidectomy because there was no evidence of bone necrosis, and also because patient's hearing was good.

Patient was discharged from the hospital January 7, 1918, in good condition. So far not sufficient time has elapsed to be able to tell whether my patient is cured or not.

Dr. Dixon examined the specimen and reported as follows:

"I have to report on the tissue removed from the antrum of N. H., that it is in the nature of a fibroangioma, with some elements which lead us to think it may probably recur, in case it has not been entirely removed, but can hardly be regarded as a truly malignant growth. There are a number of spaces in the tissue which indicate the possibility of the presence of cholesterin crystals, which have been dissolved out during the process of the preparation of the tissue. There is a slight amount of irritation present, and also a little pigment. Dr. Weeks went over the sections with me and concurs in the above."

In concluding, I would like to review a few outstanding features of this case:

1. The excruciating character of the pain.
2. Its periodical occurrence.
3. The ease and rapidity with which the membrana tympani would heal, leaving no trace of an incision or perforation.
4. The absolute dryness of the canal between attacks and absence of all symptoms.
5. The complete absence of inflammatory signs at any time.
6. The black color of the discharge accompanied by blood and mucus.
7. The little impairment in hearing.
8. No evidence of bone necrosis.

Considering all the above outstanding facts, and not knowing the pathology of the tissue removed from the antrum at the time of operation, was I justified in just doing a simple mastoidectomy, or would a radical mastoidectomy have been preferred in this case?

DISCUSSION.

DR. KING said that he had seen the case in the infirmary and had seen Dr. Lempert operate upon the mastoid, also the

pathologic report made by Dr. Dixon. It was a very interesting case. In making the diagnosis of malignancy, however, the clinical course of the case should be considered as well as the pathologic findings. This patient gives a history of discharge from the ear for five to seven years. Malignancy of the mastoid is a very rare condition. Dr. King said that so far as he had been able to find in the literature, only about fifty cases have been reported. The patient is a well nourished man and his appearance gives no evidence of malignancy. So far as could be judged by the history of the case and the general condition of the man with the ear trouble for seven years, it does not seem to be a malignant affection.

DR. DENCH inquired in regard to the exact localization of the growth. There is a distinct type of cases due to inflammation of the geniculate ganglion, just as we have cases of trigeminal neuralgia due to inflammation of the gasserian ganglion. If the growth was at the aditus with the base attached very deeply, it would correspond to the localization of the geniculate. Of course the hemorrhage was due to the angiomatous character of the growth. Dr. Dench said that he had seen one case where there was no doubt a hemorrhage of the middle ear, only in that instance the pain was not so severe as in this case.

DR. HELLER said that one statement made by Dr. Lempert did not seem to suggest malignancy—the discharge showed a mixed infection with staphylococci predominating. This, even with the absence of all inflammatory symptoms, is not consistent with the diagnosis of malignancy.

DR. RICHARDS said that one or two anatomic points might be of interest in connection with Dr. Lempert's case. In examining the structure of the mastoid of a cadaver—particularly one of the pneumatic type—with a hand lens we will often find visible (to the naked eye) a plexus of vessels running from the knee of the sinus along the inner aditus wall to the tympanum. It is possible for an angioma to involve this plexus of vessels and give rise to a slowly increasing hemorrhage, with the symptoms enumerated.

In view of such a tendency, it would be interesting to know if the patient showed elsewhere any tendency to angiomatous involvement. Furthermore, it occurred to him to ask Dr. Lem-

pert whether, in examining the nose, there was not present on the triangular cartilage any evidence of marked vessel enlargement, which is sometimes seen springing from the base and running upward over the cartilage in tree-like fashion and from which branches troublesome recurrent hemorrhages take place.

DR. LEMPert, replying to Dr. Dench's inquiry in regard to the localization of the mass, said that it was filling the entire antrum and was in the region of the semicircular canals.

Replying to Dr. Richards, he said that he had never observed any dilatation of the blood vessels of the columnar cartilage of his patient.

He would like to have an expression from the section as to whether or not he was justified in operating as he did, or whether he should have performed a radical operation.

Paper: The Radical Mastoid Operation—Indications, Technic, and

Results—Presentation of Ten Operative Cases.*

By J. MORRISSETTE SMITH, M. D.

The radical mastoid operation is not accorded the recognition it deserves by the otologists of the present day. It is not indicated in all cases of chronic aural suppuration, but it is the only adequate procedure in a certain percentage of these cases.

Chronic infections, generally speaking, may be divided into three classes: (1) Those intratympanic infections with little or no involvement of the attic; (2) those cases involving not only the tympanum but the attic, antrum and, to a limited extent, the mastoid; (3) those cases involving the intratympanic, attic, antrum, and mastoid structures as well.

The cases in class one practically never need a radical operation. It may or may not be indicated in class two; but is usually indicated in class three.

The different steps of the operation require no enumeration here, but emphasis should be laid on the following points: The facial ridge must be lowered to the lowest limit of safety; the attic should be thoroughly cleaned out, especially all of the zygomatic cells; the hypertympanic space would be oblit-

*Author's abstract.

erated, the eustachian tube thoroughly cleaned out, and the tip of bone at the outer rim must be reduced. Then the space between the outer ridge and the oval and round windows must be entirely freed from cells and diseased tissue.

The object of the operation is to have the cavity cover over with the skin. The only way to accomplish this is to keep down the granulation tissue, and this can be done only by the persistent and personal care of the surgeon; upon the success here depend the results, especially the hearing.

In order to obtain a definite idea of what to expect from the radical operation, the writer took ten consecutive chronic otitic cases, performing the radical operation upon them in his clinic at the New York Polyclinic Hospital. The cases are presented so that the results obtained may be observed.

Cases 1 and 2.—Alice C., age fifteen years. Double discharge for fourteen years. Hearing before operation, C¹ (256) fork air just heard; spoken voice, two feet.

Radical Operation.—Right, September 30, 1915; left, October 30, 1915. Both ears dry in eight weeks. Postoperative hearing: Air conduction, 64 fork (C⁻¹), 5 seconds; watch, 12 inches; acoumeter, 20 feet; whisper, 20 feet; spoken voice, 35 feet. Same both ears. Hearing markedly improved.

Case 3.—Maria F., age thirty-three years. Discharge thirty-one years. Hearing very poor. Radical operation, March 2, 1916. Ear dry. Hearing: air conduction, C fork, watch, 4 inches; acoumeter, 6 feet; whisper, 6 feet; spoken voice, 15 feet. Hearing much improved.

Case 4.—Mary M., age twenty-eight years. Double discharge since infancy. Radical operation, right, May, 1916. Ear dry and hears best with operated ear. Hearing, postoperative: Air, C⁻¹ (64) fork; watch, 8 inches; acoumeter, 8 feet; whisper, 8 feet; spoken voice, 18 feet. Hearing improved.

Case 5.—Marjorie C., age nineteen years. Discharge since childhood. Radical operation May, 1916. Ear dry at times; at other times slight mucoid discharge from tube. Ear dry. Hearing: Air, 64 (C⁻¹) faintly heard; watch, 8 inches; whisper, 15 feet; acoumeter, 15 feet; spoken voice, 30 feet. Hearing improved.

Case 6.—Bernard H., age eighteen years. Discharging sinus behind ear for fifteen months, following simple mastoid

at some other hospital. Operation cholesteatoma radical, June, 1916. Ear dry. Hearing: Air, C fork (128); whisper, 4 feet; acoumeter, 6 feet; watch, 6 inches. Round window visible. Hearing same as before operation.

Case 7.—Pearl W., age seventeen years. Discharge fifteen years. Hearing good. Radical operation July 20, 1916. Secondary skin graft. Ear dry. Hearing C¹ (64) fork air, several seconds; watch, 8 inches; whisper, 20 feet; acoumeter, 20 feet; spoken voice, 20 feet manumetric membrane. Hearing practically same as good ear.

Case 8.—Henry M., age eighteen years. Discharge sixteen years. Radical operation October 18, 1916. Cholesteatoma found. Hearing: C fork air, 10 seconds; watch, 4 inches; whisper, 6 feet; acoumeter, 6 feet; spoken voice, 10 feet. Hearing same as before operation.

Case 9.—Sura H., age thirty-two years. Discharge fifteen years. Radical operation October 22, 1916. Ear dry. Hearing practically nil before operation; now, air, C (128), several seconds; watch, 8 inches; whisper, 15 feet; acoumeter, 12 feet; spoken voice, 25 feet. Hearing much improved.

Case 10.—Alice H., age thirty years. Discharge twenty-seven years. Radical operation November 4, 1916. Ear dry. Hearing: C fork, air, several seconds; watch, 10 inches; whisper, 15 feet; acoumeter, 15 feet; spoken voice, 25 feet. Hearing much improved.

DISCUSSION.

DR. FRED WHITING said that those who had the opportunity to look at these cases presented by Dr. Smith must feel that he was entitled to congratulations in regard to the satisfactory outcome, and if the other twenty-five cases to which he had referred presented as good results he had reason to be proud of them.

Years ago when we began doing the radical mastoid operation consideration was directed only to the arrest of the discharge, giving little attention to what the hearing might have been before or after the operation was over. The main idea was to arrest the suppuration. In a certain proportion of cases this was done; in others, not. After having been satisfied with these results for a certain length of time, it was found that occasionally we got a better result than was antici-

pated, and then we began to estimate how we could get a considerable series of such cases.

Dr. Smith had discussed the indications for the radical operation, and there was no criticism to be offered in regard to them. Dr. Whiting said that he was in perfect accord with all that Dr. Smith had stated. His description of the steps of the technic was very complete, and one could only emphasize those steps to which attention had been directed.

There were five important stages in the operation. First, the opening of the aditus very thoroughly and the lowering of the facial ridge so as to make as wide an opening as possible between the superior and inferior pillars of the aditus—for if this is not done one will be apt to leave a focus for granulations and will have a condition which will make it difficult or impossible to insure dermatization of the antrum.

The next step of importance is the thorough cleaning out of the epitympanum, the thorough removal of the auditory plate, so that there may be no focus for the granulations, with the same treatment of the hypertympanum, and the clearing out of any cells which may run into the floor of the bony meatus.

Then thorough attention must be given to the eustachian tube, particularly with reference to the reaming out of the border. In addition to that, the careful destruction of the periosteum lining the tube. Dr. Whiting said that it has been his custom to put into the tube a cotton tipped applicator dipped in a 1/500 bichlorid solution, and to thoroughly remove whatever may remain of the mucoperiosteum as far as the isthmus.

The last step he would emphasize was the thorough curetting of the posterior border of the tympanum and promontory, particularly in the situation of the pyramid between the foot plate and the stirrup and the facial ridge. The granulations are very apt to accumulate there unless one curettes very thoroughly and watches for them closely.

As regards the after-treatment, if eternal vigilance is the price of liberty, eternal patience and saintly perseverance is the price of good hearing in a radical operation. As Dr. Smith had said, if the operator turns the case over to an assistant

he may expect, if not a failure, a very modified degree of success.

Anyone who had examined these cases would have noted how free they are from any dense masses or bands of fibrous tissue.

Dr. Smith had said very little about using the graft. Evidently he does not use it as much as some do. Dr. Whiting said that he considers the use of the graft very important. It shortens the period of after-treatment very materially, since it serves to discourage the growth of exuberant granulations, and is the means of preventing the feature which Dr. Smith had emphasized—the accumulation of granulations and bands of organized tissue in the tympanum and over the promontory. Dr. Whiting said he had nothing new to say about the use of the graft. All those present knew as much about it as he: some approve of its use, others do not, but he believes in it. Even in case it does not take well, it will form disseminated small nests of epidermis from which new epidermis spreads more rapidly than can be secured by many applications of nitrate of silver, etc. One point about the application of the graft Dr. Whiting has found of great advantage. He had been accustomed to hold it in place with pledgets of cotton, filled with one or another sort of powder, but later he found it to do better after being in position, if held by a wick of sterile gauze into the meshes of which borated vaselin has been thoroughly incorporated. When the graft is in position, he introduces a hollow canula into the tympanic cavity and holds it in position, and through this canula he feeds the wick of gauze. It gradually accumulates until the entire tympanum is filled and pressure is evenly distributed over the superior and inferior bony walls. Then a second wick is put in place and held in the same way. By this method one is not apt to dislodge or displace the graft.

DR. RICHARDS expressed himself as thoroughly in accord with all that Dr. Whiting had said in commenting favorably on this series of cases. There was very little to be said in criticism of the operation. It was an admirable series, and it would probably be prolonged, for in observing these cavities one could see that certain features had been attended to which will guarantee continued success.

If one considers the radical cavity as made up of two parts separated by a vertical plane dropped transversely through the facial ridge, the trouble in nearly all cases of nonhealing is found to be anterior to the plane mentioned—that is, to the part corresponding to the original tympanic cavity. The reason for this is that all operators succeed in removing the dead bone from that portion of the cavity corresponding to the main body of the mastoid; it is the anterior portion of the cavity which requires especial attention and which tests the operator's technic.

The first great step necessary for placing the radical cavity, particularly the anterior portion of the cavity from which trouble most frequently comes, is the absolute lowering of the facial ridge down to the level of the facial nerve. This is the most frequently committed grave error, and while Dr. Smith had succeeded in securing excellent results in his series, Dr. Richards felt that in several of the cases the ridge could have been lowered to a greater degree with advantage. Again, the fringe of bone corresponding to the anterior face of the facial ridge, which is usually irregular and jagged, must be removed from before backward to the vertical limits of the facial nerve in order, first, to secure the maximum width to the apex of the cavity, and second, to expose to attack the cells of the posterior inner tympanic wall and those of the hypertympanum.

A very important step in the operation is to lower the floor of the bony auditory canal so that the floor of the hypertympanum and the floor of the canal are in the same plane. The hypertympanum is then represented by no pit, and until its external wall is removed the hypertympanum itself is not accessible to attack.

A third step in the operation which is of extreme advantage is the shaving down of the convexity of the anterior wall of the bony auditory canal. This accomplishes several things: First, it widens the anteroposterior diameter of the apex of the cavity and prevents an epithelial septum from later pigeon-holing the apex from the main body of the cavity. This is an unfortunate and very common occurrence. This **unfavorable** condition is averted by carrying out the three steps just mentioned. A second advantage gained by removing the

canal convexity is that we secure a splendid view of the region of the tube and therefore do not have to make an unnecessarily large cartilaginous meatus to enable us to see the tube.

A fourth step, which every operator appreciates the necessity of, is the removal of the tip of bone overhanging the mouth of the tube. In addition to this, it has been his practice to evulse the tensor tympani muscle so as to enlarge the tube opening and permit a thorough view and curetting of it. It is surprising to what a depth, under these conditions, one can look into the tube.

One point that had impressed Dr. Richards in this series of cases presented by Dr. Smith was that the cavities were remarkably smooth, even so late after the operation. It is quite common, months after the operation, to see irregularities of contour appearing, due to the protrusion of epithelial septæ (out) into the cavity. They jut from any ridge-like irregularity of the bone. This could mean but one thing—that is, that the bone cavities in these cases were rendered remarkably smooth at the time of operation. This is a very important point, because upon the smoothness of the cavity depends somewhat the thickness of the granulation bed which eventually lines it, and upon the thickness of the blanketing membrane depends, to a great degree, the hearing.

Dr. Richards said that it had been his practice not to graft radical cavities until after a granulation layer had begun to spring up from the cavity. The portion of the cavity which he was particularly anxious to epidermatize early was the facial ridge and inner tympanic wall in the region of the windows.

This demonstration of Dr. Smith's illustrated what may be expected from the radical operation when properly done, in conserving the hearing, and Dr. Smith was to be congratulated upon the excellence of his results.

DR. DENCH said that he had been greatly interested in the cases shown. The results were certainly most gratifying, especially in regard to the hearing. As a matter of fact, he himself was one of the first to contend that the radical operation, instead of being a menace to the hearing, was in many instances a conservative measure. In some cases where he has operated upon a double otitis, the hearing in the poorer

ear was so much improved that the patient urged that the better ear be operated upon in the hope that the hearing would be still more improved. That is the best proof one could have that the radical operation, instead of being a menace to the hearing, offers great promise of improvement. He has seen this demonstrated so many times that he has no hesitation in operating upon cases of double otitis, and in no instance has he been disappointed. Though the hearing is not always improved, yet one can accept the rule that he laid down at the International Otological Congress in Bordeaux in 1904 in regard to these conditions: that we have three groups of cases to consider. First, those where the hearing was very good before operation. There, the hearing will probably be somewhat impaired. If the patient heard a low whisper before, he will probably hear much better after operation, unless he heard it before at twenty feet, he will probably not hear it so well afterward; if at ten feet before, he will probably hear about the same or somewhat better; if at less than ten feet, he will probably not hear it quite so well afterward. If the tuning fork shows some involvement of the perception mechanism. The case must be investigated to ascertain whether the lesion is confined entirely to the conducting mechanism. If this is the fact, there will be an improved hearing following the operation.

Dr. Dench said that he objected to one or two of Dr. Smith's statements. First, that chronic suppurative cases with free drainage will be perfectly safe without operation. They are not safe. An attic that is not diseased is not always a safe condition. Very early in his practice he had a case that taught him that. The patient had a large kidney-shaped perforation; the inner wall was not thickened, and it was not dermatized. When asked whether or not the case should be operated, he expressed the opinion that there was no danger of an intracranial condition and that operation was not demanded. A little later the man died of meningitis. The mere fact that there is a large perforation will not prevent infection from traveling up. Any purulent otitis is a dangerous condition. It is more dangerous, as Dr. Smith said, when the vault of the tympanum is involved. A process in the lower part is

more apt to drain, but it may easily extend upward into the vault.

Another point to which Dr. Dench objected was the term panotitis. It might perhaps be called a pantympanitis, for the mastoid and middle ear are practically the same thing, one being merely the prolongation of the other.

Dr. Dench said he was glad to hear Dr. Richards refer to a point which he himself had hesitated to speak of. Dr. Smith had spoken of obliterating the posttympanic cells and completely lowering the facial ridge, but this had not been done in all the cases presented. However, whether or not the ridge was lowered sufficiently, these patients did hear. So far as hearing was concerned, the results were magnificent, and there was reason to be proud of them. Doubtless in future work Dr. Smith would take off the anterior portion of the ridge and more thoroughly expose the cavity.

In regard to grafting, Dr. Dench said that he had always been an advocate of the primary graft in middle ear suppuration, and believes that if the procedure is properly carried out better results will be obtained than if the cavity is allowed to heal by the slow process. Dr. Smith spoke of his cases getting well in eight to ten weeks, but Dr. Dench could not recall a case in his private or hospital practice where the suppuration had continued for that length of time. In fact, he had sent many patients home after three weeks for a radical operation, and had sent a number home after two weeks.

Dr. Dench said that Dr. Whiting had spoken of putting in two or three grafts in the tympanic cavity, but he could see no reason for that. As a matter of fact, he had cut a graft from a child three years of age, and carried the skin out on the posterior surface of the mastoid, as he had described before the Otological Society three years ago, so that one graft covered the entire radical cavity and the margin of the meatus. The great secret of the application of the graft was brought out by Ballance, who described the use of the pipette in removing the air under the graft. Make a graft that is intact throughout, apply it to the margin of the newly formed radical cavity, and withdraw the air from beneath it with a pipette. It will go way down into the eustachian tube, and the whole cavity will be smoothly and evenly covered. It does not make

any difference how it is held in position—whether by aristoledgets, a little gauze, etc.—so long as it is kept in perfect approximation, but it is essential to get out all the air and to have all the surface smooth. To do the radical operation successfully, one must go into healthy tissue throughout, and he had never been troubled by sequestra forming. If you are a careful operator, you will do your last case better than your first. It is simply a question of going over your technic time and time again, until you are more nearly perfect.

Dr. Dench agreed with what had been said about clearing out the eustachian tube so that you can see into it thoroughly, and then if you use the primary graft properly it goes right down and closes it; or you may take a little chip of bone and put that in to close the tube.

The appearance of granulation tissue during the period of convalescence depends on what sort of cavity has been made: If you have a perfectly smooth cavity, you will have very little granulation tissue. If you use escharotics you will have granulations. If you simply clean the cavity it will do better than if you keep on packing and using silver nitrate, etc. In very few cases of late has he used escharotics over the tympanic wall, and uses very little curetting. If the facial ridge is lowered to the limit, the anterior portion of the spur removed, and any granulation tissue removed that may be there and near the ossicles, you will have very few granulations. If this is scraped out, the promontory stands out fairly clear. If the curette is run over the region lightly you will have the ideal thin membrane for covering.

Nothing had been said about the size of the meatus. That was a very important point. Dr. Dench said that he has operated upon a great many cases, and in a very large proportion of them he has found that the cause of failure was that the external auditory meatus was not wide enough to ventilate the cavity. First, it depends on the size of the cavity which is to be aerated, and then it depends on the condition of that cavity at the time of operation. With a case that is fairly clean, a smaller meatus is required than in a case with extensive disease of the bone.

DR. SMITH, closing the discussion, referred first to the question of the skin graft and said that he had not done a

great many of these grafts, although he thoroughly approves of them. He does not believe in employing them when the dura is exposed, for he feels that there is a certain amount of danger to the patient from meningitis when skin is put into a cavity that has dura exposed; in other cases it shortens the convalescence. A smooth, regular cavity is of course very important.

The criticism made in regard to the facial ridge was perfectly justified. These cases could have had the ridge lowered a little more thoroughly than was done, but he was endeavoring to get good results and to have both sides of the face remain as nearly the same as possible.

In regard to the point made by Dr. Dench concerning cases of chronic suppuration with a large perforation, he had stated in the paper that these cases require careful study. Not all of them require operation, but all of the points must be carefully studied together before deciding that it is necessary to operate. The mere presence of a discharge does not necessarily demand a radical operation. Some of these cases will get well without radical operation. Dr. Dench was correct in regard to the term panotitis. It is a misnomer, since we are presupposing an intact internal ear.

Referring to what had been said about the eustachian tube, Dr. Smith said that he had stated in the paper that he endeavored to clean out all of the mucous membrane and granulations, also to remove the rim of bone in the outer wall. Dr. Dench's point in regard to the external auditory meatus was well taken. A good opening helps to produce a dry cavity, and there will be less trouble with a large opening. In these cases the flaps could have been larger and would doubtless have helped in the after-treatment.

As Dr. Whiting had said, it requires a great deal of time and patience to prevent the formation of granulations in these cases; therefore it is wise to make a large cavity and remove as much bony tissue as is safe and desirable, for a good clean cavity is more likely to dermatize and dry up quickly.

Dr. Richards made a good point in saying that the time in which the healing is secured had much to do with the thick-

ness of the membrane. The longer the time, the thicker will be the membrane. The primary graft shortens the time of healing and is advisable when there is no exposure of the dura.

THE NEW YORK ACADEMY OF MEDICINE.
SECTION ON OTOTOLOGY.

Meeting of February 8, 1918.

**Thrombosis of Sinus and Jugular Complicated by Empyema of
Both Maxillary Sinuses.**

BY H. BEATTIE BROWN, M. D.

J. S., age thirteen years. Color, white. Admitted to the hospital on December 3, 1917. Diagnosis, double antritis. Patient came into the hospital complaining of pain over both antra. X-ray showed cloudiness in both antra, more marked on the right. A double radical operation (Caldwell-Luc) was performed by Dr. Harris on December 4th, at which both antra were found to be very much diseased. (Urine report on December 4th, previous to the operation, showed it to be acid, amber, with heavy trace of albumin, no sugar; sediment contained many pus casts.)

On December 7th packing was removed from the antra, and irrigations of normal sterile saline solution once daily were begun.

By the 10th of December the urine was free from albumin. The temperature during the convalescence always remained high, varying from 100.6 to 103.4.

On the night of December 14th the patient complained of pain in the left ear, examination of which disclosed a bulging in the posterosuperior quadrant. Myringotomy was performed and irrigations of normal saline were ordered to be given every two hours (two quarts each time). The return of each irrigation was usually cloudy. There was slight tenderness over the mastoid, particularly at the tip. His temperature still remained between 100.5 and 103.4.

December 16th. At this time the antra seemed to be almost cleared up. On December 17th I was asked to see the patient and found his left ear discharging profusely, with a moderate degree of tenderness over the entire mastoid. An X-ray was taken of the mastoid, the report from which was negative for mastoiditis. Disregarding this report, however, I decided to open the mastoid, which was done on December 19th. At the

time of the operation patient's temperature was 103.6. The mastoid was found to be completely full of pus, the bony covering of the sinus did not appear healthful, and when it was removed the sinus was found completely collapsed from just below the knee to the point of junction of the sinus with the jugular bulb. The sinus was covered with granulations throughout the entire area of exposure. The sinus was then opened and curetted as far down as the bulb. An organized clot was first removed and then several pieces of thrombus of irregular shape measuring about a quarter of an inch each way and a sixteenth of an inch in thickness were removed, but as very slight hemorrhage followed, the neck was prepared for the removal of the jugular vein. The ordinary operation was done, making an incision from the tip of the mastoid to the clavicle below, the vein ligated at the lower end under the clavicle, then dissected up to a point above the facial, where it was ligated and the vein removed. The thrombus in the vein could be seen before ligation as far down as the junction of the lower and upper half of the vein. A cigarette drain was placed in the wound throughout its entire extent, the wound closed with interrupted silkworm gut sutures and the whole put up in a wet saline dressing. Before leaving the operating room the patient was given an infusion of five hundred cubic centimeters normal saline on account of his very poor pulse.

December 20th. The patient was put on strichnia $1/60$ every three hours, and a murphy drip given continuously. Temperature dropped to 98.8.

December 21st. Temperature ran to 105.6, and on the 22nd it reached the high limit of 107. At this time pulse was 138 and respirations 28. The patient was given digalen, 15 min., alternating with camphor, grains 2, every two hours. An infusion of four hundred cubic centimeters was also given.

December 23rd. Temperature, 106; pulse, 140; respirations, 22. The same stimulation was given and infusion of four hundred cubic centimeters normal saline.

December 24th. Temperature, 100.6. Digalen stopped; camphor increased, 6 grains every three hours. Infusion three hundred cubic centimeters normal saline given.

December 25th. Infusion three hundred and fifty cubic centimeters normal saline given. Temperature, 105.4; pulse, 140; respirations, 22.

December 26th. Temperature, 102; pulse, 122; respirations, 24. Patient appeared to be somewhat irrational in his talk. From the date of operation, December 19th, until this date, December 26th, the neck wound was dressed every day. The cigarette drain being shortened about an inch at each dressing, and on this date, December 26th, the last inch of drain was removed and the sutures also were removed, the entire line of incision having healed by primary union. I have said nothing about the mastoid wound, because everything pertaining to this followed the usual method.

On December 27th, temperature was 100, and from that date continued each day to approach the normal, until the 11th day of January it was 98.4.

On January 18th the patient was discharged cured.

I desire to give due credit and thanks to the house surgeon, Dr. Cosby, who virtually took charge of the case after the first dressing.

Laboratory Reports.—Blood, December 13, 1917: Leucocytes, 11,050; polynuclears, 60 per cent; lymphocytes, 31 per cent. Blood, December 17, 1917: Leucocytes, 11,300; polynuclears, 80 per cent; lymphocytes, 20 per cent.

December 18, 1917. Widal negative.

December 19, 1917. Culture taken at time of mastoid operation showed straight streptococcus infection.

DISCUSSION.

DR. ALFRED KAHN asked if he was correct in understanding that after the jugular operation the temperature went up to 105 or higher. Such a high temperature remaining after a jugular operation usually would cause one to think of further complication, other infection, probably in the sinus towards the torcular, and one might be inclined to seek such a complication.

The case is interesting and illustrative in that in this instance recovery took place without interruption, showing that a high temperature in blood vessel cases does not always indicate operative interference.

DR. TALBOT CHAMBERS said that the temperature of 105, 106 and 107 was a most extraordinary record, and he congratulated the doctor on the recovery of the patient.

DR. CARTER asked how long the empyema of the antra had existed before the radical operation.

DR. GATEWOOD, the house surgeon, to whom Dr. Brown referred the inquiry, said that it was a chronic antrum condition when the man came to the hospital. At the hospital he was under observation for about a month before operation.

DR. CARTER said that he made the inquiry because it is generally conceded that it is inadvisable to do a radical operation on an acute antrum. There probably was a connection between the radical operation on the antrum and the development of the otitic condition. In his opinion the majority of infected antra can be cured by irrigation, and every case should be given a fair chance with this treatment.

DR. GUTTMAN said that we often hear of positive X-ray findings where no other clinical symptoms but the X-ray plate give the indication for operation, and the operation confirmed the diagnosis of the X-ray plate. In this case the skiagram showed a negative result, and at the time of operation the Doctor found the antrum full of pus. This was the first instance he had heard of where the X-ray was inconclusive, inasmuch as the negative X-ray plate was contradicted by the positive finding.

DR. LEWALD asked if the radiographic evidence was absolutely inconclusive, and then cited a case where the plate led to a controversy, and it was found that a mistake had been made and the plate was supposed to represent a particular individual and did not. Was it certain that no such mistake had been made in this instance? He then told of a case recently presented at one of the section meetings where the radiographic finding of a pin was not confirmed, and a few days later the child passed the pin. The X-ray examination had not included the region where the pin had lodged. The evidence ought to be absolute before this is accepted as a negative radiographic finding.

DR. ALFRED KAHN said that he did not understand where the association came in between the antrum of Highmore and

the jugular condition. He could not interpret how the infection in the antrum of Highmore was related to the jugular.

DR. BROWN, replying to Dr. Kahn's question, said that one of the former speakers had referred to the same point: the connection between the mastoid and the antrum condition. This boy had both antra filled with pus, and the condition had been going on for a long time, possibly more than two months. The boy was septic from head to foot. In Dr. Brown's opinion, there was very evident association between the condition of the antrum and the ear. Just how the connection occurred he could not say, but it was through the system in some way—as sure as could be—a general septicemia, ending with a mastoid and a jugular thrombosis.

Replying to the remarks by Dr. Guttman and Dr. Lewald in regard to the radiographic findings, Dr. Brown said that he had not had a large experience, like Dr. Kerrison and others present, but that he had seen a good many, and he knew of five other cases where the radiograph was at fault, this one making the sixth. He was satisfied that the radiographer who did this work was an experienced, thorough and perfectly reliable person, and this man sent down a report of a positively negative condition, so far as the mastoid was concerned.

Dr. Scruton had emphasized the matter of the bleeding and the cleaning out of the sinuses. Dr. Brown said he had not gone into that detail in the short history presented, but he had never seen a case of jugular thrombosis in which there was so much clot. In the first place, he opened the sinus from the knee down to the bulb, then curetted and lifted out a clot three-quarters of an inch long by one-eighth of an inch thick, organized, but soft. After that, with the curette, he lifted out of the bulb nine pieces of the thrombotic material he had spoken of, which looked like cartilage. What it was he could not say. While he did not cut away the walls of the sinus thoroughly, he did everything else and had the sinus absolutely clean. Dr. Scruton had made a good point when he spoke of the importance of early dressings. The wound should be dressed the next day after operation and every day thereafter.

Paper: Report of Cases of Deafness of Uncertain Origin, Greatly Benefited by Antispecific Medication.*

BY GEORGE E. DAVIS, M. D.

DISCUSSION.

DR. TALBOT CHAMBERS inquired if Dr. Davis thought syphilis was the cause of the deafness in the second case, why did he not give the patient antisyphilitic treatment.

DR. DAVIS said that he had submitted the case for discussion as to diagnosis, but as it was a very recent case, he had not yet instituted antisyphilitic treatment, as the patient was from the country and had not returned since the positive Wassermann report. However, this would be administered as early as possible. The first patient was given mercury, etc., with very decided improvement in the hearing.

DR. GUTTMAN asked if he was correct in understanding that Dr. Davis ascribed the conditions described in the third case as being due to the hypertrophy of the thyroid.

DR. DAVIS replied that he considered that the patient was suffering from a toxic condition. The cases were simply presented for discussion in regard to the diagnosis, not for treatment, but to illustrate the importance of the knowledge of functional tests in the diagnosis and treatment of deafness. The first patient had been treated for eighteen months for middle ear catarrh, but had never received a functional test. The test showing shortened bone conduction had suggested the diagnosis to him, and notwithstanding the negative or feebly positive Wassermann report, he went ahead and gave antisyphilitic treatment, and the patient's hearing was decidedly improved. The last case was cited to show that these patients sometimes go to a general practitioner complaining of vertigo alone, and frequently the cause is a very difficult matter to diagnose. A careful functional test of the ears in this case did not disclose any local trouble that would account for the vertigo. There was no disturbance of the static part of the ear, but the patient had thyroid enlargement which would account for the vertigo and heart condition. The vertigo was only momentary, and examination would probably

*See page 233.

eliminate syphilis entirely, although no Wassermann had yet been made. The fact that she had a large thyroid suggested the possibility that the condition was merely toxic. We know that can arise from many conditions; we have thyroid toxemia, luetic, arsenic, etc. If one does not make an accurate diagnosis and treat the cause of the condition, you will not have very good therapeutic results.

Paper: The Examination of Applicants for the Aviation Service of the United States Army—Disqualifying Factors in Fifteen Hundred Cases—Some Observations of Past-Pointing After Rotation.*

BY CAPT. W. A. SCRUTON, M. R. C.

DISCUSSION.

DR. KERRISON, referring to Dr. Scruton's observation that failures in test-pointing were due to a faulty position of the head, asked him to explain just what was meant.

DR. TALBOT CHAMBERS asked if X-ray pictures were made of the tooth roots.

DR. SCRUTON replied in the negative, and said further, that the requirements for the teeth were rather indefinite. They call for four sound teeth for grinding purposes, two above and two below, so that they are opposite—all the other teeth can be out, apparently. Men with good bridge work are accepted.

Replying to another question in regard to the manner of testing the men, Dr. Scruton said that they use a card with ten pictures on it—a tower, battleship, cruisers, etc.—and the man is told to focus the apparatus by starting beyond focus and gradually come into focus; suddenly the items in the picture stand out before him, and they look as though they were hung in space; every picture appears at a different distance from the eye; it is not the size of the picture that enters into the question, but the distance. The apparatus used for this test is called the stereoscope. A number of the men came back for tests on the stereoscope and got in all right.

In regard to the test for colors, it would be difficult to fool the examiner on that, for the Jennings card which is used can-

not easily be memorized. Some of the men claim that they are paint mixers—if they call colors according to their ideas they are likely to be wrong.

Replying to Dr. Kerrison's inquiry about past-pointing, Dr. Scruton said that when a man was put in the chair and turned, if his head was not in the right position the results would be inconclusive. As soon as the chair is swung the man's head may go to one side or the other. Jones' chair is not good, but it is the best obtainable. An attempt has been made to so modify it that the head is held in position, but the plan proved impracticable.

Dr. Scruton also explained the importance of having the pointing done at the proper height. This test is often made with the hands of the tester held too high.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of December 18, 1917.

DR. STANTON A. FRIEDBERG, THE PRESIDENT, IN THE CHAIR.

Dentigerous Cyst.

DR. JOSEPH BECK exhibited the patient, shown at the last meeting. He had operated since that time and found a cyst with teeth in it. It was easily peeled out without entering the antrum. The cavity was lightly drilled with a bur, and subsequently bone wax was packed in fairly tight. The anterior surface of the superior maxilla was wired to the alveolus, and two or three silk sutures were introduced. The wax came out gradually, but suddenly a large piece was expelled, and at this time the cavity was only half filled with granulation tissue. He considered the operation a partial failure. The depression in the hard palate found before the operation still existed, but he intended to make a section in a sort of a flap and push it up and fill up the cavity. He was showing the case now so as to judge fairly how difficult it was to cure these conditions.

DR. H. L. POLLOCK reported on the case of dentigerous cyst he showed at the November meeting. He had operated the previous day and removed the cyst, which had filled up the entire antrum. It had absorbed the anterior wall of the antrum and on removing the sac he found that it contained the third molar. After removing the cyst he sewed up the slit and then filled up the cavity with bismuth paste. (The specimen and some stereoscopic pictures were exhibited.)

Lingual Abscess With Report of Two Cases.*

By JOHN A. CAVANAUGH, M. D.

DISCUSSION.

DR. L. W. DEAN, Iowa City, Iowa, said that about four weeks previously a patient came into his service with a diag-

*See page 213.

nosis of abscess of the tongue. The patient himself had made the diagnosis. He said that about ten days before he had pain on swallowing, which gradually increased, and with the pain the swelling of the tongue developed until his mouth was filled and he was unable to swallow. The patient came with the mouth partially open, the swollen tongue protruding between the incisors and the mouth could not be closed. Because of the swelling, further examination of the mouth could not be made. The breathing was through the nose. Temperature, 103; no cervical adenitis, no swelling of the salivary glands. An examination was made under general anesthetic. Palpation of the back of the tongue with the finger revealed a mass apparently the size of a small hen's egg which had no fluctuation. The mass had the same feel as a sarcoma of the base of the tongue. Using a curved bistoury, the mass was incised, with the escape of just a little pus. There was a marked edema about the epiglottis. The patient showed evidence of laryngeal obstruction during the operation, and a tracheotomy was performed. Ten hours after the operation the larynx was completely occluded, justifying the tracheotomy. The patient made a good recovery in about ten days.

DR. JOSEPH BECK stated that he had had several cases of abscess of the tongue, which he reported at the last meeting of the American Medical Association. One was not strictly an abscess of the tongue, but the case was interesting in this connection. The patient was brought in by a physician who said he had been with him practically all the time for the two previous days. The patient had complained of difficulty in swallowing and breathing, and the doctor made a diagnosis of probable abscess of the tongue. Local applications of a mild astringement gave some relief, but finally the distress in breathing became so great that the patient was brought to the hospital in a cab. He tried to walk from the door to the operating room, but fell into the Doctor's arms and appeared to be struggling for air. Dr. Beck made a rapid tracheotomy, but there was no respiratory response in spite of all possible efforts. Postmortem showed an infected lingual thyroid. These cases are very rare. In a case of acute abscess of the tongue in which he made a deep incision in the tongue and evacuated the pus and gave relief from the edema which was

present, he intubated, employing a large tube that would not be expelled so easily, which he felt sure did all that a tracheotomy would have done, with less traumatism. Some of these cases of abscess of the tongue had been shown by the work of Kümmel to be chiefly syphilitic, a secondary infection or a gumma.

DR. E. B. WUNDERLICH thought if pyorrhea was present in a tooth that a secondary infection from syphilis would be very likely to cause an abscess. He had had a case of this sort in which the patient died ten months later. Postmortem showed a syphilitic condition and also pyorrhea. In another case there was marked pyorrhea.

DR. CHARLES H. LONG cited a case which he had under observation. The patient was a woman aged fifty-four years, who had a constant burning, sticking pain in the back of the tongue. The lingual and faucial tonsils were hypertrophied; the tongue itself was not swollen, not painful on pressure. There was no cough. The patient had lost twenty pounds in weight during the last nine months. There was no record of globus hystericus. The Wassermann test was being made, but he felt that the cause of the trouble had not yet been discovered. He doubted if the term "globus hystericus" had any real place in medicine. (Later.—Report Wassermann negative. Diagnosis, without microscopic report, probable carcinoma of the tongue.)

DR. STANTON A. FRIEDBERG was of the opinion that etiologic factors in the acute and chronic cases were entirely different. He thought infection could very readily occur through the lingual tonsil and through the papilla. The most striking characteristic was the difficulty and inability to move the tongue. Sometimes there would be an indurated area, but seldom definite fluctuation. One other condition that might cause confusion in the acute cases was rheumatism of the tongue, where pain and stiffness were complained of on movement of the tongue.

DR. CAVANAUGH, closing, believed Dr. Dean might be correct in advising tracheotomy in acute cases. He considered it a safe procedure.

As to Dr. Beck's intubating such cases, he considered this an excellent plan if one was thoroughly skilled in the intro-

duction of the tube. Otherwise, he thought tracheotomy was preferable.

He agreed that the abscess might occur as a result of infection from pyorrhea, but it had not been definitely decided as to where the infection came from.

He believed Dr. Long was right in thinking that globus hystericus had no place in medicine and thought the use of the term was often due to ignorance of the real trouble.

Paper: Diagnosis of Intracranial Ear Complications, With Report of Cases.*

BY GEORGE W. BOOT, M. D.

DISCUSSION.

DR. JOSEPH C. BECK thought the presentation of Dr. Boot was wonderful and that the county and city were to be congratulated on having a man on the staff of the County Hospital who would devote so much time to that institution. The cases at the County Hospital were usually so severe that very few of them recovered, because they required such extensive and experienced after-care.

He disagreed entirely with Dr. Boot's method of drainage with the rubber tube. It was obsolete and should not be employed. The abscess should be drained with rubber tissue, a sort of a cigarette drain, because the tube could fill up and become blocked with material from the abscess.

He had had the same experience as Dr. Boot in coming up to the abscess with a needle and not into it, the needle simply making an indentation and not puncturing the wall, but on postmortem the abscess was found.

He was glad to hear a new symptom of a thrombus of the longitudinal sinus, and wished Dr. Boot to state specifically regarding the other case of longitudinal sinus thrombosis, because he thought he had such a case at present in which he had made a diagnosis of typhoid fever. Nose bleed and headache were both present.

He had heard nothing mentioned about employing the symptom known as the Crow and Beck of Vienna, compression

*See page 220.

of the opposite side internal jugular and examination of the fundus oculi finding distended veins.

He thought some criticism might be expressed in making a diagnosis of periarthritis in connection with a mastoid. Why not think of a sinus thrombosis right away and explore?

DR. GEORGE E. SHAMBAUGH thought that the intracranial complications met with in connection with purulent disease of the middle ear are the most trying cases with which the otologist has to deal. The most frequent of these complications appear to be the extradural abscess, a complication which occurs so frequently with such indefinite symptoms that it is difficult to recognize clinically. It seems not unlikely that many of the cases of brain abscess owe their origin to a neglected extradural abscess which remained unrecognized until the formation of the brain abscess. He cited a couple of cases illustrating the difficulty in recognizing the extradural abscess.

One case was a woman of about fifty years of age, who consulted him several years ago, because of a persistent one sided headache which had lasted for several months. Examination of the case discovered nothing intranasally to account for the headache. She had never been a victim of migraine. There was a history of discharging ear many years before on the affected side, but she stated that she had not had any discharge from the ear for several years. Examination, however, disclosed a marginal perforation in the upper posterior quadrant, and the introduction of a cotton swab detected the slightest trace of moisture, which had, however, the characteristic odor of a bone-invading disease. On operating on the case the mastoid was found entirely sclerosed, a very much contracted antrum, and at the upper posterior angle was found a discolored tract leading off upwards and posteriorly. This tract was opened up for perhaps fully half an inch from the antrum, when a small extradural abscess was uncovered, containing only a few drops of thick creamy pus. The case made an uneventful recovery.

Another case was that of a physician, who came complaining of a persistent discharge from an ear which had been operated on for acute mastoid complication a couple of months previously. The patient seemed to be annoyed by discomfort

in the head which could hardly be described as a headache. There was a profuse purulent discharge escaping from a fistula in the original mastoid opening, with a slight temperature of not over 99.5° . In exposing the mastoid it was found that the previous operation was limited to a small passage made to the antrum. The lower half of the mastoid still remained intact and contained large pneumatic spaces filled with pus. A complete exenteration of the mastoid was performed, and it was believed that the persistence of a discharge was due especially to the involvement of the cells at the tip. The patient, however, did not get well, and the persistence of symptoms, in spite of the complete exenteration of the mastoid, made the diagnosis of some extramastoid complication probable. Another operation was undertaken, and at the upper posterior angle of the mastoid an extradural abscess was discovered, the size of a small hazelnut, and located fully three-quarters of an inch from the antrum.

It was in this particular location where the extradural abscess was most likely to be discovered, and in this connection it was well to remember that the marginal cells of the mastoid—that is, those located at a distance from the antrum—were, as a rule, much larger than the pneumatic spaces located in proximity to the antrum. This applied not only to the cells occupying the tip of the mastoid, but to those found along the posterior margin. The larger the cell involved in a suppurative process the less chance it had of getting well spontaneously.

DR. J. HOLINGER asked whether in the cases that, from the later course or a postmortem, proved to be meningitis or meningeal irritation, as for example in brain abscesses, died, Dr. Boot always find Kernig and Babinski symptoms present during lifetime. (Dr. Boot said he did not.) Dr. Holinger said the reason he had asked about the Kernig and Babinski signs was this: He had operated on a lady, sixty-two years old, who complained of severe headaches and earache and absolute sleeplessness for five nights; also dizziness and discharge from a central perforation. She was very ill and resisted every motion of her head. There were a number of other uncertain symptoms, among them vertical nystagmus of short duration. He considered the case suspicious of

meningitis and operated. She made a very slow recovery, during which a constant one sided headache caused a consultation to be held. A neurologist and two members of the Laryngological Society were called. One colleague considered the case suspicious of meningitis; the other and the neurologist took the standpoint that if the Babinski and Kernig were absent there was no meningitis, therefore the operation was not necessary, and said so to the house physician. In the literature of 1915 there was an extensive paper by Mygind on the findings in meningitis. He said Babinski and Kernig were not always present.

The very careful work of Dr. Boot was of importance for the indications for operations. The doctrinarian standpoint of neurologists and some colleagues might be dangerous. He emphasized that if we always waited with operations until all symptoms of meningitis were present we would lose every patient.

As to the technic of exploring for brain abscess, he mentioned that very often the pus was much too thick to go through any needle, or a needle might become clogged in going through the brain and, although it was in the abscess, no pus was evacuated. The postmortem gave the explanation. He thought the proper instrument was a small, long knife for stabbing through the dura and brain tissue. This could be followed up afterward with drainage. He believed a cross incision in the dura might lead to hernia of the brain, which could usually be avoided with the straight stab.

DR. BOOT, closing, said in regard to the case of longitudinal sinus thrombosis that the patient was a young woman, who was just about to graduate from Northwestern University. There was nothing in the past history except that she had had cystitis. She was taken sick, and her physician thought it was typhoid fever; she had headache and possibly nose bleed and her mental condition was clouded. Examination showed the drum membrane with no bulging but simply a redness showing through from the inner wall. Her mental condition became worse and she finally died. Apparently the thing was a metastatic condition from the cystitis.

With regard to the Crow-Beck symptom, he did not place much confidence in it.

As to drainage, he considered the rubber tube fully as effective as the gutta percha. In the case which was considered rheumatism, the patient had no symptoms of a mastoiditis, not even a discharge from the ear, but a history of having had a discharge a few weeks before, and under the circumstances they did not feel justified in going into the mastoid.

One thing in the cases which he had missed and which one saw referred to frequently was the stalk running up from the middle ear to the abscess.

He considered it a mistake to use a needle for draining the middle ear; something should be used that would effectively open the abscess and permit the pus to get out. There was much less risk in this than in making an opening too small to permit free drainage.

His experience with the neurologists in these cases had been disappointing. He thought Dr. Beck might recall the recent case at the County Hospital of an abscess of the nose, where a neurologist had examined the patient, and by means of the X-ray and the Abderhalden test had worked out just exactly where the growth was, but on postmortem it was not there at all.

The Babinski and Kernig had been present in most of the cases of brain abscess, but not in the meningitis cases, but he did not lay much stress on either of them.

Dr. Holinger said the cross incision was a mistake and that the incision should always be a straight one, but in one case where he had a hernia the incision had been straight and not over one centimeter long.

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XXIV.

AN INFORMAL REPORT ON OTOLARYNGOLOGY IN THE FIRST YEAR OF THE WAR.*

BY LIEUT.-COL. HARRIS P. MOSHER, M. C., N. A.,
WASHINGTON.

This paper deals with the following subjects: The activities during the past year of the Section of Surgery of the Head; the Base Hospitals at the cantonments, some gossip about them, and the medical problems of the cantonments; the present and future needs of otolaryngology as to personnel; and finally, a few comments on the character of the medical work in the army and why the writer believes that it is a grown man's work and not, as it has been dubbed by a few of the present stay-at-homes, work to be done by boys.

The writer's duty up to the present time has been largely in recruiting medical personnel for otolaryngology. This

*Read in part at Atlantic City, June, 1918, at the combined meeting of the American Laryngological Association, the American Otological Association and the American Laryngological, Rhinological and Otological Society.

naturally has aroused deep feeling, and the closing paragraphs, I am conscious, are at least reminiscent of this feeling.

ACTIVITIES OF THE DIVISION OF SURGERY OF THE HEAD.

During the war the interests of ophthalmology and otolaryngology have been cared for in two ways. First, a committee for each specialty was organized under the Council of National Defense. These committees were responsible for sending out questionnaires, and tabulating the returns and helping with the first assignment of personnel. The second method of caring for the interests of the two specialties was the assigning of two members from the original committees of the Council of National Defense, one for ophthalmology and one for otolaryngology, as official members of the Surgeon General's office. A section of surgery of the head was then organized, Major Blair and Major Bagley completing the section, the first representing oral and plastic surgery and the second brain surgery. Colonel Lyster became the head of the section; but Colonel Parker who, since last October, has been the acting chief, has recently been officially placed in charge. The men assigned to the Surgeon General's office for the division of surgery of the head naturally consult and work in harmony with the parent committees of the Council of National Defense. The Council of National Defense, however, has always been an advisory body and, from the nature of things, can be nothing else. The officers in the Surgeon General's office naturally avail themselves of its counsel, but the division of surgery of the head is the only legal body, so to speak, that deals with the affairs of otolaryngology, ophthalmology, oral and plastic surgery and brain surgery. Surgery of the head is classed as a separate division in the Surgeon General's office, but in the field as one of the sections of the surgical division, the other sections in this division being general surgery, orthopedic surgery, genitourinary surgery and roentgenology.

The original committee of the Council of National Defense for otolaryngology was Dr. Charles W. Richardson, chairman, Dr. Burt R. Shurly and Dr. H. P. Mosher—Colonel T. C. Lyster, representing the army, and Surgeon G. B. Tribble, representing the navy, were soon added. After serving on the committee a few months Dr. Shurly resigned in order to go

overseas in charge of a base hospital, and his place was taken by Dr. Joseph H. Bryan.

The medical officers composing the division of surgery of the head, working with the committee of the Council of National Defense, further classified the names sent in in response to the questionnaires; planned a special head building for the cantonments; selected instruments and advised in the selection of the personnel for the cantonment base hospitals in this country and for the base hospitals abroad. An investigation of ear protectors was carried out under the direction of Major Richardson. Naturally there were many other activities in which they took part but those just mentioned are the main ones.

In the latter part of October, 1917, Colonel Lyster, Major de Schweinitz, Major Mosher and Major Jones were ordered overseas for two months' temporary duty. During Major Mosher's absence Major C. W. Richardson took his place in the office of the Surgeon General. Before the party sailed overseas Major Richardson was given charge in the Surgeon General's office of the reeducation of the deaf, and Dr. Max A. Goldstein came into the service in order to be associated with this work. Dr. H. W. Loeb also came into the service and was assigned the position of editor of a war manual for otolaryngology. He spent some time in Washington collecting data, and then returned to St. Louis and continued his work there. The volume on which he has been working for the past months consists in the main of abstracts of the war literature with comments. This is to be followed by a condensed operative manual. In addition, there will appear a volume of abstracts of recent war literature dealing with the specialties which compose the division of surgery of the head. This volume of contemporary abstracts will appear at intervals, it is hoped, for the duration of the war.

The section of brain surgery has conducted a neurologic school in Philadelphia, New York and in Chicago. The section of oral and plastic surgery has had a school in St. Louis and one in Chicago. Neither the section of ophthalmology nor the section of otolaryngology has undertaken separate schools, feeling that the making of competent specialists in these two lines was not a matter that could be satisfactorily accomplished in a short period of a few months.

The whole subject of medical instruction in the army, however, is now being coordinated by a school of instruction just starting at the Officers' Training Camp at Camp Greenleaf. All branches of medicine and surgery are to be taught there, or rather reviewed. The specialties which represent the section of surgery of the head are, of course, to have their representatives. Major Thomas J. Harris is to take charge of otolaryngology. Military necessity permitting, this course is to cover a period of some three months.

A hospital for the surgery of the head has been started at Cape May. It is planned to send appropriate cases there as they return from overseas, and it is to act as well as the hospital of last resort for head cases occurring in the hospitals in this country. The staff will be a brilliant one. Two staffs are contemplated—one to go abroad when the call comes, and the other to continue the work when it leaves. A corps of specially trained nurses has been at Cape May for some months. A small number of cases is already under treatment there, some thirty of which have returned from overseas. The building used for the hospital is a hotel which did not pay until taken over by the Government. It will hold about 500 patients and is beautifully situated. The staff is eagerly awaiting the full equipment and the full number of patients. In the meantime the attractive bathing facilities help while away the time.

Major Greenwood has just landed overseas in charge of a number of optical units, and Major Blair is also overseas, having crossed in charge of oral and plastic units which were requested by General Pershing. Lieut.-Col. de Schweinitz for the moment is taking Lieut.-Col. Black's place in the Surgeon General's office while he is on a western inspection trip. Lieut.-Col. Mosher is looking after otolaryngology, Major Bagley brain surgery, and Major Ivy is taking Major Blair's place in charge of oral and plastic surgery. The chief work of all these men is to get adequate personnel and to place it to the best advantage. In addition, as stated above, publications of war literature have been issued, schools established, students assigned to them, proper teachers obtained and the courses supervised. The main work always has been and will be until the end, the delicate work of choosing and caring for the per-

sonnel. If I may be permitted to say so, firmness, judgment and tact and, as far as possible, an individual knowledge of the applicants, are essential for even a partial success at this undertaking. Having charge of personnel in many ways is not an enviable position.

The section of surgery of the head has for purposes of administration an independent existence in the Surgeon General's office and a semi-independent existence in the base hospitals. The main services in a base hospital are medicine, surgery and laboratories. The section of surgery of the head is classed, like general surgery, orthopedic and genitourinary surgery, as a section of the surgical service. The chief of any section may be selected chief of the surgical service. The chief of the section of surgery of the head has been selected as chief of the surgical service twice—Major Ellett, at Camp Meade, and Major Todd at Des Moines. The chief of the section of surgery of the head, the chief of general surgery, the chief of orthopedics and the chief of genitourinary surgery, as well as the chief of roentgenology, alike report to the chief of the surgical service, whose duty it is to coordinate the work of the whole service.

As a matter of fact, in most cases it has worked out that the section of surgery of the head has been allowed practically an independent career.

The section of the surgery of the head is gradually achieving a position abroad much like the position which it holds in the Surgeon General's office. Its influence is markedly felt there, because each base hospital that goes overseas has an ophthalmologist, an otolaryngologist, an oral and plastic surgeon and a brain surgeon selected for it in the Surgeon General's office. Major Blair, who, as I said, has just landed overseas, has been appointed by the chief surgeon, A. E. F., as consultant for oral and plastic surgery for the forces abroad. Major McKernon, of the Postgraduate Base Hospital, who has been in France now for a year, has been appointed consultant for otolaryngology, and richly deserves it. Major Greenwood has been appointed consultant in ophthalmology. Major Cushing has been appointed consultant in brain surgery.

Base Hospital No. 115, which is practically a head hospital, has just been asked for by cable.

OBSERVATION TRIP OVERSEAS.

Now a few words about the trip abroad of three of the members of the section of surgery of the head, and Major Jones. Colonel Lyster went with the double interest of the medical care of the flier and the use of the specialists; Major Jones went in the interest of the medical care of the flier, and Lieut.-Col. de Schweinitz and Lieut.-Col. Mosher represented ophthalmology and otolaryngology, respectively. The party was away four months. They spent a little over two months in France, with Paris as their headquarters, and came back by way of England, staying there a short time. Lieut.-Col. de Schweinitz and Lieut.-Col. Mosher paired off and traveled together amicably; Colonel Lyster and Major Jones, for the most part, traveled together, except when Major Jones, during the latter part of the trip, went alone into Italy. While the hoped-for results and those actually obtained did not always correspond, its members brought back much first hand information which has since proved very useful, and more than one suggestion made by the members of the party has since been put into operation.

Lieut.-Col. de Schweinitz and Lieut.-Col. Mosher visited the English hospitals, where there were special eye centers, or centers for oral and plastic surgery. Otolaryngology is not yet recognized as a specialty in the English army, and there were no centers to visit. In the English army the eye service is well organized. Next in excellence of organization come the oral and plastic centers, of which there are two in France and one in England. Next the observers visited an advanced part of a French hospital sector. In this they found that the surgery was largely specialized. For instance, at one hospital of three thousand beds, twelve miles from the line, thoracic surgery and brain surgery were done by one man, bone and joint surgery by another, and wounds of the soft parts by a third surgeon. It was learned that early and thorough surgery had almost eliminated sepsis and that the Carrel treatment was seldom necessary. In this same sector, at a city perhaps thirty miles from the line, a special hospital for head

cases was found and a special hospital for fractures. In other words, the French were everywhere specializing their surgery as much as possible. Major Jones, as I said, was the only one of the party to go into Italy. On his return he confirmed what we learned from other observers who had been there, that the Italians have gone even further than the French in specializing their surgery. Everyone who goes to Italy comes back greatly impressed with the efficiency of the Italian surgery.

We reached France at a time when the American base hospitals were just getting on their feet. The first period of organization was over, and they were getting their final buildings under way. It is no secret that lumber was scarce. The initial buildings, therefore, of almost every base hospital were summer hotels or French schools or monasteries. Most of these the French already used as hospitals. The French, however, turned them over to the Americans, who at once began to build additions in the shape of wooden huts. None of the American hospitals had been doing much surgery up to the last of February, the time we left, except one that was situated far north, and the surgery there was civil surgery. Most of the American base hospitals were principally occupied treating infectious diseases, of which they had a good supply, and pneumonia. The plan was just being put in operation of sending from each hospital an operating team to the Casualty Clearing Stations of the English and French, a plan copied from the English. It really will save the day, because without it the hospitals at the coast will never see any surgery but remain as they were when we saw them, hospitals for treating cases of infectious diseases coming off the transports, and convalescent hospitals for cases sent back from the hospitals more fortunately situated.

Naturally we became very much interested in the whole question of hospital organization and management. Besides reporting on how the specialties were cared for by the English and French, we reported on this larger subject to the chief surgeon, A. E. F., and later to the Surgeon General. The chief recommendations of the report were that base hospitals should be placed as far forward as possible and that they should have radial control; that a consultant should be appointed for each

branch of medicine and surgery, and for each of the components of the section of surgery of the head; that a chief should be appointed for the section of surgery of the head, and a special head hospital established at a fitting time. Further the report urged that operating teams should be sent to the Casualty Clearing Stations as a routine from each base hospital, and that centers of instruction in brain surgery, oral and plastic surgery and the surgery of the eye and ear be established. The operating teams were being started, and some of the teaching centers were roughly in operation when we left. It was recommended that whatever consultants were appointed should supervise a sector radially from the front to the rear and be responsible from the front to the rear for the continuity of the treatment.

We learned, somewhat to our astonishment, that the greatest wastage of men in the various armies was caused by common and rather undignified diseases, namely, by trench fever, due to the louse, and by boils and scabies. We found that last winter very many of our men were landed overseas ill with bronchitis or influenza or soon came down with these diseases. When we left a formidable committee headed by Major Strong was preparing to exterminate the louse.

THE MEDICAL PROBLEMS OF THE CANTONMENTS.

Much that I have to say about the cantonments is already familiar to you because they are all so nearly alike, and everyone here must have visited at least one of them. As you know, they are small cities with a population of twenty to forty thousand. Although they were built in a few months, they have all the appointments of cities of years of growth, from churches to jails, and from libraries and theaters to fire engine houses. They are cities of youth, and poverty and old age are never seen. Except for the nursing staff women play no part in them. In the normal cycle of a man's life death alone is present.

At these cantonments there are sixteen base hospitals for the National Army and fifteen for the National Guard. Besides these, there are scattered over the country general hospitals, post hospitals and special hospitals. One of the special

hospitals is being fitted out as a hospital for head surgery. Reconstruction hospitals and hospitals for reeducation are soon to come. The number of beds in the cantonment base hospitals varies between 1,000 and 2,000, the beds in the general and post hospitals from 150 to 500. One special hospital for tuberculosis has 1,000 beds, and the hospital for head surgery has a maximum capacity of 500. Up to the present time the total number of beds planned for in this country is over 70,000. I am not at liberty to give even approximate figures, such as the ones just given, for the hospitals contemplated and actually built abroad, but the American public can rest assured that there will be an adequate number.

In the cantonment base hospitals the death rate is of course low, because the soldier citizens were chosen as physically fit before they took up residence there. The sick rate also should be low, and is low, but a curious fact, well known to all experienced medical men in the army, soon became evident—namely, that the grouping of these apparently well young men was at once followed by epidemics of disease. The infectious diseases of childhood at once appeared and took a very virulent course. Pneumonia, the friend of the old, became the deadly enemy of the young. Cerebrospinal meningitis, which is relatively rare in civil life, became almost common.

An apparently well man is often a carrier of bacteria which he gives to his fellows. Men who have long lived together, however, seem to acquire an immunity to each other's bacteria; but take men who are strangers and assemble them in large numbers, as they are today assembled in the cantonments, and infectious diseases at once appear, in spite of the healthy mode of life. Infections borne by food and drink—for example, typhoid fever, have been practically stamped out. Breath borne infections, the bacteria of which live in some part of the respiratory tract, preferably the nose and throat, are yet to be conquered.

There are no vaccines for most of these diseases. The fundamental point in dealing with them, therefore, is to prevent them by avoiding overcrowding and by providing adequate ventilation. Recurring epidemics of cerebrospinal meningitis which took place last year at the barracks of one of the most celebrated regiments in England were controlled

by such measures. For example, the sleeping huts, which previously contained thirty beds, had ten beds taken out, so that the minimum distance between each bed was two and a half feet. In addition, half of the windows of each hut were opened at the top on a slant and nailed in this position and untouched, regardless of the weather.

As the men come to the camps well, the problem is to find at once the soldiers who are carriers of disease and isolate them before they can infect their mates. This was accomplished in a dramatic fashion at one cantonment recently by having twenty-four teams of medical officers meet the incoming troop trains and take cultures from the nose and throat of each recruit. The soldiers who were found to be carriers were at once isolated and treated. Work of this kind means that the bacteriologists in this war are an overworked set of men.

The problem of the carrier is the acute medical problem of the cantonments. It is becoming evident that the nose and throat are the abode of choice of the streptococcus and probably of the organisms responsible for many of the infectious diseases. The prophylaxis of infections of the respiratory organs is a most pressing problem in this country and abroad. Striking results in the control of infectious diseases have been obtained in at least one cantonment by the use of gauze masks, and in measles the use of the gauze mask has been made compulsory. Of this problem only the surface has been scratched. Never before, however, has such an opportunity been offered to solve it. If it can be solved it will be one of the great medical achievements of the war. The poisonous gas of the enemy can be seen. We take the elaborate masks which are used by the soldiers to protect themselves from it as a matter of course. The germ laden breath of the soldier cannot be seen, but it is even more deadly than the gas. It would cause a smile if every soldier on a transport was required to wear a gauze mask when below or between decks, or if a less novel measure was ordered—namely, that every soldier should carry a piece of gauze and be required to cough into it. Had either of these measures been a routine procedure on the transports this last winter, my feeling is that instead of men landing in France ill with acute or chronic pharyngitis, acute or chronic tonsillitis or acute or subacute bronchitis, which was the con-

dition of things all through the cold weather, the percentage of such diseases would have been markedly reduced. I feel strongly on this point, and I am certain that I am not making a mountain out of a mole hill.

In addition to the problem of the carrier at the base hospitals the following problems have come up for solution: The control and prevention of venereal diseases; the treatment of infectious diseases and of diseases of the respiratory tract; and the treatment of the surgical complications of these diseases, such as tonsillitis, mastoiditis and empyema. The otolaryngologist, the general medical men and the bacteriologists have been by far the busiest medical officers. Waves of infection have passed over some of the cantonments, and the streptococcus has had a field day.

Only supposedly well men are chosen for the army, because its sole purpose is to fight. The chief purpose of the medical corps, therefore, is to keep the soldier well. Unfortunately, it is not its only purpose, because well men get sick and fighting men must be injured. Naturally the most dramatic part of the medical officer's work in the army is caring for the wounded; the most important part, however, is keeping the fighting men well. Preventive medicine, therefore, is the medical problem of the army *par excellence*. Those who have the vision to engage in the solution of its problems have under their control in the army an unparalleled human laboratory and the opportunity of a century. I feel that physicians do not as yet realize this.

If practice makes perfect, the otolaryngologists in the army today should be experts in opening peritonsillar abscess, in resecting the septum, in tonsillectomy and in mastoidectomy. They can never hope, however, to catch up with the number of tonsils that are acting as foci of infection and thermostats for streptococci. The dentists can never hope to clean up all the teeth that are foci of infection, and the surgeons, operating as they do in some of the cantonments on ten to twenty cases of hernia a day, can never see the end of their task. It is my belief that the soldiers who are to compose our standing army which is to help maintain peace when it finally comes will never be allowed to take their place in the ranks unless

they have a normal nose and throat or have them made normal by operation.

I am much concerned at the present time about the scientific results of the medical work of the army. Naturally, of course, I am interested first and chiefly in my own specialty. My efforts must be largely confined to reminding the men in the hospitals that a great opportunity lies at their hand and urge them to grasp it. In a great measure it is a matter of keeping adequate records. One hesitates to add more paper work than is already necessary in the army. The initiative in this matter lies with the commanding officers of the base hospitals and the chiefs of the medical divisions. By means of the army records men can be traced for years to come. What better chance on a large scale has the medical profession ever had of settling the results of certain operative procedures—for example, tonsillectomy in chronic affections of the heart or of the joints—than is before it now? Practically every medical man serving in the army wants to go abroad. I have been in France twice during this war, but I can assure you that it is a great question in my mind whether there is not a fuller scientific opportunity in this country than overseas.

THE EQUIPMENT AT CANTONMENT BASE HOSPITALS—

PERSONAL NOTES.

The equipment at the cantonment hospitals is nearing completion. At the beginning of the war it was found that eighty per cent of the surgical instruments were of German make. The instrument firms of this country were at once lined up and asked for maximum output. For a time the men who were first at the hospitals had but little to work with except the instruments which they brought with them or had sent from their offices. Now it is only a question of asking for reasonable things and knowing how to ask for them and to have a vigorous commanding officer back up your request, and repeat it if necessary, in order to get all essential instruments. Naturally the whim of every operator for special instruments cannot be granted. It is still good policy, however, to carry your pet instruments. Then you operate at your ease from the start. If the instruments wear out, you can call this your

contribution to the cause in place of buying more Liberty Bonds.

Speaking of being first on the ground reminds me that in the beginning days some of the men did not see why they were required to be on the spot so early, why they were not left until things were further along. They were sent because their experience was needed to start things properly. In banks clerks are not made directors. Of course in many cases the men first on the ground were uncomfortable. In the beginning some murmured a bit; now they brag of it. I have yet to talk with one of the pioneers who would have missed these beginning days. In many cases they made the hospital what it is at present, even, like Day, taking part in the carpenter work. Where the men realized their job they saw to it that the head building was not pushed off the map, that it was not used for extra barracks, that it was well placed, that the original plan was even improved upon. Take Holmes, for instance: he was put in charge of all the building by the commanding officer, and the result is no surprise to those who know him. The rest of the hospital had steam for its operating room. As a matter of course Holmes soon had it for his building. He got not only steam but everything else that the army allows, and I suspect some things that were not allowed. In fact, he has one of the show places among the cantonment hospitals. He is an early bird if there ever was one, and always collects a large basket of worms wherever he goes. Pierce is happy at Grant, now that he can keep his shoes and his clothes clean. Eagleton, at Dix, is still in a delirium of enthusiasm. Knowles has a fine place at Devens, and Skillern has developed a taste for administrative work and has aspirations to become a commanding officer. He also is much interested in his band. He has promised to embarrass me by meeting me with it when I next go there. Harris has gone to Oglethorpe to take charge of the teaching of otolaryngology. His worries have begun and mine have finished. Berens, Greene, Emerson and Fetterolf are just coming into the service. Wherever they go, the Surgeon General's office can rest assured that things will run right. Levy got as far away as he could and is at Camp Lewis, American Lake, Washington. Wherever men of this stamp are placed there will be no more rumors of substandard work like

Wild's incision for mastoiditis, and no suspicion of over-operating.

Haskins went early to West Point and is now professor of military hygiene. Friedberg is at Doniphan and one of the men working under him says that being in the clinic there is better than any postgraduate course abroad.

Since the entrance of this country into the war, Ingals has died. He took great pride in acting for the Surgeon General's office as state adviser, looking up the standing of applicants and furnishing the Division of Otolaryngology with their rating. His figure comes back to me now as he stood last year by the dinner table after the banquet of the American Laryngological Association. He spoke about the war and said quietly but firmly, as was his custom, how he regretted that he could not take a more active part. He did his part, however, to the limit of his strength, after the habit of his life. He suffered greatly, but lack of patriotism in a friend or acquaintance hurt him more than the pain of one of the cruellest diseases.

THE PROBLEM OF THE SURGEON GENERAL'S OFFICE.

Naturally there have been many worrying problems for the Surgeon General's office to pass upon. Of these, otolaryngology has had its share with the other departments. The first was the problem of consultants. Three or four consultants were appointed, but the plan from the start worked poorly, and the medical officers who held such positions had to be given the choice of taking full time duty or going on the inactive list. Part time service is considered by the man who is giving full time as an unjust discrimination against him. He holds that all men have an equal right to it, and they have. Not only does it carry an unjust discrimination, but it destroys military uniformity and control. These, of course, are simply other names for discipline, and discipline is the backbone of the military machine.

The commanding officer of an army hospital naturally has pride in having a staff of medical men who can cope with all the cases that come to his hospital, however difficult. If he is not so fortunate in his personnel or if unusual cases occur,

he is at liberty to call in the most available civilian physicians. This has been necessary in at least one hospital and may be necessary again, unless more of the experienced otolaryngologists of the country enter the service. There will be, of course, some men who cannot enter the service on account of physical disability, age, or some other sufficient and good reason. Let these men, if they want to be of use, make themselves known as standing ready to help as civilians, but they should be careful not to embarrass the Government by trying to be both in uniform and out of it.

Service as contract surgeon has not been used in otolaryngology, although it has been employed in some of the other divisions. Pressure is being continually brought to have the government use the civilian hospitals as a part of the war machinery. If I should give my own opinion in this matter, it would be that if the war is to continue three or four years more I can see how this may become necessary. At the present time, however, it brings up the old question of divided control and part time service. The Surgeon General's office, therefore, does not favor it.

The problem of the medical student has met a happier solution. Procuring a medical education is considered by Washington as preparation for the medical corps of the army, and the medical student graduates by law into that corps. Those who are serving internships in hospitals have been allowed a year for such service. Naturally, however, many of the more ambitious and the most patriotic among our young men prefer to enter the army at once and let the army experience take the place of the internship.

As I look at it, it is axiomatic in a war of the magnitude of the present one that our hospitals are to be short handed, and that the medical schools must run on reduced personnel. Elaboration of courses must be eliminated for the time being and the schools come down to the three R's of medicine. Both hospitals and medical schools, however, can help themselves by doing away with the age limit and bringing back into service the men who have retired. There is at present a committee in the Surgeon General's office which has this most important matter of teaching in the medical schools in charge for adjustment. There is every disposition to look on both

sides of the question—England's mistake is well known. The Surgeon General's office has been fully reminded of it.

THE NEED FOR MEDICAL OFFICERS.

I am continually asked if there is still need for medical men in the service. Sixteen thousand are now serving, but an imperative call has gone out for five thousand more. In the general branches of the medical service physicians of large hospital experience are badly needed. From all the cantonments the cry comes, send us experienced men. Otolaryngology is better off than general medicine and surgery. However, when the base hospitals begin to go overseas in numbers there will not be enough experienced otolaryngologists to take their places. To make the department of otolaryngology what it ought to be there should be on file, ready for instant use, the names of two hundred otolaryngologists of ripe hospital experience. These men should be ready to send in their application papers on telegraphic notice. As fast as the proper openings occur they could then be fitted in. At present the available list is less than fifty. As things stand now, if your name was on such a list you might be used in six weeks or six months. However, by standing ready to apply for a commission you have put yourself at the disposal of the government and have fulfilled your duty, at least as I see it.

If you take the combined membership of the American Otolological Society, the American Laryngological Association, and the American Laryngological, Rhinological and Otological Society and omit the duplicate names and compute the percentage of the members who are in the service it is found to be about twenty-two per cent. There are five Lieutenant-Colonels—Kopetsky and Imperatori in the field ambulance; Haskin, professor of military hygiene at West Point, and Richardson and Mosher in the Surgeon General's office. There are forty-one Majors, twenty-six Captains and eight Lieutenants. The records also show that there are in active service two hundred and ten otolaryngologists and two hundred and thirty-two ophthalmologists. Unfortunately, I haven't the figures for the special sections of the American Medical Association. Owing to the large size of these sections, I imagine that the percentage would be somewhat less.

RETENTION IN A SPECIALTY.

In the beginning of the war the Surgeon General, with his large grasp of affairs, made the statement that specialists would be used in their specialty as far as the exigencies of the military service permitted. No absolute promise could be made and none was made. Naturally some men have tried to kill the goose which laid the golden egg by considering this statement a promise. This attitude has been especially true of the men just entering the specialty. No military organization could stand for a minute if so constructed. Full command is essential in order to meet changed conditions and emergencies. Up to lately the great majority of the specialists who came into the service have been used in their specialty. A few that have been found incompetent have been transferred to other lines of the medical service. I am aware also that a few men have escaped retention in their specialty, and these failures, I am aware also, will be talked about and made the most of to the end of the chapter. The fact remains, however, that never in any war before have the medical officers been fitted in according to their talents and special training as they have in this war; and this is all due to the recognition of modern medicine by the present Surgeon General.

Within the last month the shortage of medical officers has become so acute, the needs of the field service, without which the army from the medical standpoint could not exist a day, have become so pressing that all the medical men within the draft age, trained in a specialty or not, have been released to field service. This, of course, is essentially a young man's job and one that appeals to the right kind of a young man. This emergency has made it difficult now to retain in his specialty any man under forty. How long this shortage of men in the field service will last depends in a great measure on how the medical men of the country respond to the recent appeal. It was this scarcity of medical men which made the last call of the Council of National Defense necessary. War has always been an affair of young men, inconceivably sad, of course, but in a just cause, most glorious. This war, from a medical standpoint, has been an affair of older men.

It goes without saying that all physicians are not equally well trained; that all have not had the same hospital advan-

tages. As all the physicians did not enter the service at the start and at the same time, it follows that those who came in first will rank, for a time at least, those who came in last. You cannot make it fair any other way. The men who gave up a year ago—and what they gave up in many cases was all that they had—are not to be lightly pushed aside by those who took a year to arrange, bargain and decide. There is no game in civil life where such a thing would be called fair. Why should it be asked for in entering the medical corps of the army?

There are not enough men of operating experience to make the medical service in otolaryngology what it should be. Some of the best men I know are not in the service—best in one sense. These men are beginning to come in. In the year that has elapsed they have been able to keep their homes open and to be with their families; yet in spite of having delayed, and in spite of having enjoyed these advantages, some of them ask on entering the service that they supplant the men already in the field. Not even a German would call this fair.

I am often asked where are the young medical men, what is the matter with them that there are not enough to do the commonplace work that makes up so large a part of the army medical officer's day? If they were all the sons of physicians I should say that they took after some of their fathers.

THE CHARACTER OF THE MEDICAL WORK.

The opinion is often expressed that the highly trained physician is wasting his time in the army, that he would be doing more good staying at home attending to the civilian population. At times this view expresses an honest conviction; occasionally, alas, it is used to drug an awakening sense of duty. As I see it, there is an abundance of worthy opportunity for the man able to grasp it.

It is true, of course, that commonplace work predominates; ants. There is plenty of boy's work, as some have called it; that two hundred at certain places there is plenty of no work thirty-two use an Hibernianism—plenty of just staying on the figures for 1 and prepared; which, by the way, is a new thing ciation. Ow; true, to repeat, that there are plenty of all these that the percentagd nonstimulating things; yet those who are cision to serve or not, if they let the ques-

tion rest here, miss the most vital point of all. In the last analysis, no one enters the service to do special medical work, to increase his scientific reputation or to gain one. The basic idea is to help win this war in the shortest time possible, or as the boys say, "to lick the Germans"; and nothing which contributes to this end, however tedious and commonplace it may be, is beneath my dignity, or saving your grace, beneath yours. It must be admitted that it is hard at times to hold true to this glorified view of the work, especially when you see the inequality of sacrifice made by men, even in the service, and when you learn that some of them are smugly adding to their substance, even in war time, and you know that yours is lessening—but hold true to it you must. It is your guiding star in this lonely job of measuring up to your duty in your allotted place. If you think differently and stay out of the service when you should serve, you must be prepared some day to tell your daughter—you will not need to tell her mother, for she will have it buried in her heart—that her girl chum's father, not you, kept the faith. It has made me heart-sick and weary beyond words to sit at my desk in the Surgeon General's office and read and hear this and other threadbare excuses. As I look at it, after a year of trying to do my bit, those who make these excuses have lost their American heritage of red blood.

WASHINGTON, June, 1918.

A CASE OF OTOGENOUS TEMPORAL ABSCESS
WITH HEMIPLEGIA, FACIAL PARALYSIS AND
APHASIA; CEREBRAL DRAINAGE, DECOM-
PRESSION, RECOVERY.*

BY OTTO GLOGAU, M. D.,

NEW YORK.

Miss G. A. B., eighteen years of age, was referred to me on June 5, 1915, by Dr. L. W. Wittenberg.

When four years old, patient suffered from scarlet fever. Since that time the left ear was discharging at intervals. Four years ago foul odor was noticed, the hearing impaired gradually and the patient became recently very dizzy and suffered from intermittent headaches and loss of appetite. The patient, otherwise healthy in appearance, is physically somewhat depressed and shows a rather slow cerebration.

The left drum membrane is totally destroyed, the promontory covered by unhealthy granulations. From the attic protrudes a whitish, grayish mass which upon microscopic examination proves to be cholesteatoma. C¹ not perceived, C⁴ only a few seconds. Rinné negative. Weber to the diseased side, Schwabach considerably shortened. Whispered and conversation voice not heard. Warm water and rotatory nystagmus on the left ear are combined with severe dizziness and lasts thirty seconds. Temperature, 98 F.; pulse, 70. The mastoid bone, in the antrum region, is very tender to touch.

Diagnosis.—Chronic middle ear suppuration with involvement of the mastoid bone and possibly of the brain.

Radical mastoid operation was advised and performed by myself on June 10, 1915, at the Philanthropine Hospital. Almost the entire mastoid cavity was filled out by cholesteato-

*Presented before the Section on Otology, New York Academy of Medicine, April 12, 1918.

matous masses and necrotic granulation tissue. This pathologic process encroached also upon the tegmen tympani, which had to be removed, and the dura was exposed to the extent of one centimeter. It was found to be normal upon inspection and touch. The radical operation was performed in the regular way, with the exception that the posterior wound was left partially open for drainage, on account of the exposure of the dura.

The patient apparently made an uneventful recovery, was regularly dressed and was dismissed from the hospital June 25, 1915; two weeks after the operation.

The following day, while at home, the patient became chilly, dizzy and vomited. The next day she became convulsive on the right side of her body and soon afterwards paralyzed on the entire right side, including the face, and lost her speech.

The patient was found by myself in a condition of drowsiness. There was total motor and sensory aphasia, right sided hemiplegia and facial paralysis combined with hemianesthesia. Temperature, 96 F.; pulse, 48. The eye background showed bilateral optic neuritis, the pupils were unequal, the left one dilated and sluggishly reacting. Quite some photophobia was noticeable. The patient was very dizzy towards the affected side and there was marked sensitiveness upon percussion of the squama. Lumbar puncture showed a clear cerebrospinal fluid, with decreased lymphocytes and albumen. No microorganisms. The diagnosis of left sided temporo-sphenoidal abscess was made and immediate exploration of the brain advised.

The operation was performed on June 28th, at a sanatorium, Dr. Wittenberg assisting. The radical mastoid wound was reopened and the dura exposed further, starting from the tegmen tympani and antri upwards towards the squama. The bone covering the dura was removed by means of rongeur forceps, in a curved line around the meatus ext., to the extent of two centimeters. At the lower aspect in the region of the tegmen, the dura did not show any changes. Even in the region of the squama, after exposing quite a part of the dura, no discoloration was seen, nor was the dura at any part covered by exudate or granulations. According to Körner's observation, the brain abscess is near the place of aural

infection. Consequently, the dura was incised in the region of the tegmen and the abscess searched for by introducing the brain knife upward and inward three centimeters. No pus was struck. The same negative result was obtained when the knife was directed in an upward and anterior direction.

The dura was then exposed and incised in the squama region, about one and one-half centimeters above the upper canal wall, and the brain explored. When directed towards the superior temporal gyrus, inspissated cheesy material, together with brain sloughs, were evacuated. A forceps was introduced closed and opened within the abscess cavity to induce freer drainage. The cavity was then irrigated by means of warm physiologic salt solution and inspected by means of a long Killian speculum. The cavity was found to be rather large and surrounded by thick walls. Iodoform gauze, one-half inch wide, was then introduced by means of the speculum, and a slender forceps to the bottom of the cavity, and the latter loosely packed, the drain emerging from above the mastoid wound. The mastoid wound was partially closed and drained from below.

The patient the next day was in excellent mood, talkative, or at least tried to talk, for she could only mumble, and was very joyous. The dressing was changed first every day and then every second day. Immense quantities of decayed brain tissue were evacuating continually. An extensive hernia of brain tissue occurred. After the sloughing off of the hernia, the brain was retained in position by means of an aseptic paraffin net (surglets). The exposed brain portion gradually sloughed away and, with the use of scarlet ointment, became covered by epithelium.

The recovery of her speech occurred in a most interesting way. She had to be taught like a baby. Her understanding of the spoken word gradually improved, while the motor power to pronounce it showed only one year after the operation considerable progress. At the present time, three years after the operation, the patient talks almost normally, only the letter T and L being somewhat mispronounced. Under the influence of massage and electricity, she regained gradually the muscular power of the paralyzed right extremities and is now able to walk eight blocks on a stretch, to do housework and

make herself useful. The facial paralysis has entirely disappeared.

On October 4, 1918, Dr. Neustadaeter, upon neurologic examination, found the following condition:

Reflexes: Abdominal, patellar, achilles markedly exaggerated on the right side. The pupils were unequal and react sluggishly to the light but well to accommodation. There is some clonus in the right foot and Babinski phenomenon in the same foot is present, and also the Oppenheim reflex.

Motor disturbances: There is a spastic hemiplegia on the right side of the body with athetosis in the right hand. The tongue deviates to the right. Speech: Signs of previous motor and sensory (auditory) aphasia. Cranial nerve disturbances: Deafness in the left ear, double postneuritic atrophy, more marked in the left eye. Sensory disturbances: Right hemihyperesthesia and complete astereognosis in the right hand.

In conclusion, I wish to call attention to the following outstanding features of the case:

We have apparently to deal with a chronic temporal abscess caused by chronic middle ear suppuration with cholesteatoma. When the patient was first seen, the abscess was in the so-called latent stage. The subjective symptoms were: dizziness, headaches, lack of appetite, depression and slow cerebration.

At the radical operation the exposed dura was found to be normal. Over two weeks afterwards the manifest symptoms of the brain abscess became evident. These symptoms may be subdivided, according to von Bergmann, into general symptoms, general brain and brain pressure symptoms and local brain symptoms. At the second operation, the dura did not show pathologic changes, no fistula, granulation or exudate, pointing to an extension by contiguitaten from the middle ear process towards the deeper brain tissues. The abscess was located at the upper temporal convolution quite away from the middle ear focus. The infection therefore was an indirect one, either by means of the lymphatics, the sheaths of the arteries or the nerves or, according to Körner, by extension of thrombophlebitis in the pial vessels. The abscess was first attacked from the logical port of entrance, the tegmen tympani. When exploration from this point did not reveal pus the

dura was exposed higher up into the squama, with the intention of attacking the abscess from the squama region, and with the idea of having enough decompression to alleviate the pressure symptoms, in case the abscess could not be reached from the squama region.

Prolapse of brain tissue is no untoward complication. It may be easily overcome by appropriate measures.

The crossed convulsions, hemiplegia, hemianesthesia, facial paralysis, also the motor and sensory aphasia, are not caused by the extension of the abscess cavity to the respective foci within the cortex—due to pressure action upon the motor and sensory nerve fibers within the capsula interna, as Dencker assumes, but to the remote action of the increased intracranial pressure upon and of the inflammatory reaction around the cortical centers within the anterior posterior central and the inferior frontal gyri.

Exploration of the brain in the latent stage of brain abscess is only indicated when the dura, upon local inspection, shows suspicious changes. In the manifest stage, the brain must be explored, even in the presence of apparently normal condition of the exposed dura. The exploration logically has to start from the region of the tegmen tympani, and only in case of negative result a place remote from the aural focus.

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THE PATHOLOGY OF SINUS THROMBOSIS.

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Most thrombi are described as consisting of a head, a neck and a tail. The head is usually white in color, the neck is mixed white and red, and the tail is red. The tail usually forms the bulk of the thrombus. The head of the thrombus is composed almost entirely of blood platelets. Blood platelets are small disc-shaped nonnucleated bodies, which are normally present in the blood. According to J. H. Wright of Boston, they arise from the giant cells of the bone marrow and the spleen.

The free surface of the head portion of the thrombus is covered with ripple-like markings. A longitudinal section of this portion of the thrombus shows that these delicate surface elevations are the summits of a framework of beams. The beams are composed of blood platelets, and are surrounded by a border of polynuclear leucocytes. The spaces between the beams are filled with red blood cells. There is no fibrin. The nearer we approach the free extremity of the head portion of the thrombus, the broader the beams become, and the narrower the furrows between the beams, until finally at the tip of the head portion the beams unite into a solid white mass of blood platelets. The beams are transverse to the long axis of the vessel, or oblique. They grow outward from the vessel wall. In the neck portion of the thrombus the furrows containing red blood cells, which lie between the beams, become wider. The neck portion of the thrombus is mixed red and white, because of the admixture of red blood cells with the blood platelets. The tail portion of the thrombus is red and consists of an irregularly arranged mass of red blood cells, leucocytes, blood platelets and fibrin. It resembles postmortem clot, microscopically. The portion nearest the neck is the densest portion. Here, suggestions of lamellæ can still be seen. As we approach the end of the tail the structure of the

thrombus approaches, more and more, that of normal blood.

The head portion of the thrombus is formed first. This is laid down while the blood is flowing through the vessel. When the thrombus has grown sufficiently large to completely obstruct the lumen of the vessel, the blood column becomes stationary peripheral to the thrombus, up to the place where the first anastomosing branch enters the vessel. This column of blood becomes completely coagulated in a short while. This forms the tail of the thrombus. The neck is the intermediate portion between the head and the tail of the thrombus.

A white thrombus is formed by a sticking together of the blood platelets, and is called by Eberth and Schimmelbusch a "conglutination thrombus." A red thrombus is produced by ordinary clotting of the blood, and is called a "coagulation thrombus." A blood platelet thrombus can only occur in a flowing bloodstream, and a red thrombus can only occur in stagnant blood. Very long white thrombi occur when the blood continues to flow through the vessel for a long time after the onset of the thrombus formation.

One of the factors in the formation of a white thrombus is a slowing of the bloodstream and the formation of eddies. Aschoff reproduced structures similar to the beam formation in white thrombi by placing dams and weirs in the course of a flowing stream of water, in which were suspended particles of sawdust. As a result of the slowing of the current of water and the formation of whirlpools and eddies, the sawdust was deposited at the dams and weirs in the form of ripples and net-like elevations.

The slowing of the blood current in the vein allows the blood platelets to be deposited on the wall of the vein, in the form of ridges. Before complete cessation of the bloodstream the system of platelets is covered by a layer of leucocytes. This is due to the fact that when the bloodstream is slowed the white blood corpuscles, being of lighter specific gravity than the red, tend to travel at the margin of the bloodstream and thus are deposited on the beams of blood platelets. When the thrombus fills the lumen of the vessel, the formation of the primary thrombus stops, as no new blood platelets can be carried past.

A slowing of the blood current is favored in certain parts

of the venous system, where there is a widening or bending of the vein, or where there is pressure from a large column of blood, as in the leg when the body is upright. There is a slowing of the current when there is pressure on the vein from without. These factors play a more important part when there is a defect in the heart's action, leading to a general slowing of the bloodstream in the venous system.

In addition to slowing of the bloodstream there are three other factors which play an important rôle in the causation of thrombi. These are an increased agglutinability of the blood platelets, an increased coagulability of the blood plasma and changes in the vessel wall. That slowing of the blood current alone does not cause thrombus formation was proven by Baumgarten, who showed that a stationary column of blood in a doubly ligated vessel did not thrombose. In thrombosis of infective origin there is an inflammation in the vessel wall and destructive changes in the endothelial lining of the vessel. It is likely that the bacteria in the vessel wall set free toxins which pass through the intima into the blood. These toxins, as well as the juices set free by the destroyed endothelial cells, probably act upon the blood platelets in such a way as to increase their agglutinability. An increase in the coagulability of the blood is probably also brought about in this way.

Clotting *en masse* is called coagulation thrombosis. To produce a thrombus of this type, complete stoppage of the bloodstream and an increase of fibrin ferment in the blood are essential factors.

That destruction of the endothelial lining of a vessel is not the only factor necessary to produce a thrombus is shown by the fact that thrombosis is very rare in extensive atheromatous disease of the aorta.

The thromboses which occur after operations are due, in part, to the slowing of the blood current which results from loss of blood at the operation, weakening of the heart action, general prostration and confinement to bed. Another important factor is the change produced in the blood platelets by the infection.

Eberth and Schimmelbusch produced thrombosis experimentally by injuring vessel walls and interfering with the circulation. By ligating a vessel for a while, the intima was torn,

After releasing the ligature and allowing the blood to flow through the vessel for a quarter of an hour, the vessel was incised and examined. It was found that all the prominent portions of the inner surface of the vessel were covered by adherent masses of blood platelets. After cauterization of a vessel with silver nitrate and destruction of portions of the intima, similar results were obtained.

In a punctured or incised wound of a vessel wall, in which the bleeding was allowed to stop of its own accord, the opening was found to be stopped up by a plug of blood platelets which protruded into the lumen of the vessel.

Jakowski found that by injecting bacteria into the circulation and at the same time producing a disturbance in the circulation or a slight traumatism in a vein in some other part of the body (for example, by ligation), a thrombus was produced at the point of ligation, in most cases.

Talke exposed vessels in cats, dogs and rabbits. Pure cultures of staphylococci were placed in contact with the vessel walls and the skin sutured over them. The neck or leg vessels were usually used. After nine to seventy-four hours, the animal was killed. The affected portion of the vessel was removed and examined. Forty-four vessels were experimented upon in thirteen animals. Thirteen arteries and thirty-one veins were used. The femoral and carotid arteries and the jugular and femoral veins were employed. In thirty-three cases thrombosis was found, and in eleven, none.

Bacteria were found in fifteen of the thrombi. In the remaining eighteen, numerous bacteria were present in the periadventitial tissue. In six of these latter cases the bacteria extended to the middle layers of the externa. In three, they extended to the outer layers of the media. In eight, they reached as far as the middle layers of the media, and in one case there were bacteria in the intima. The bacteria were present almost exclusively in the interlamellar clefts and lymph spaces, but not in the vasa vasorum. Very few bacteria were found free in the tissues. The progress of bacteria could be followed through the lymph spaces in the externa, media and intima, and finally into the thrombus. The bacteria were present mostly in the peripheral portions of the thrombi. The

youngest thrombi contained no bacteria. The older thrombi contained bacteria in most cases. These facts seem to show that the thrombus is formed before the bacteria reach the bloodstream. The thrombus may even be formed before there are any marked changes in the intima. The bacteria in the vessel wall produce changes in the tissue fluids. This changed tissue fluid and the bacterial toxins enter the circulation and cause the blood platelets to become more viscous and adhere to each other and to the vessel wall. Changes are also produced in the blood serum. In this way the thrombus is formed. The bacteria then enter the thrombus, either directly from the vessel wall or through the circulation.

Stenger exposed the sigmoid sinus in a dog, and placed over the sinus a tampon containing streptococci. The streptococci were obtained from a suppurating ear, and were made more virulent by passage through several animals and cultivation in very alkaline Aronson bouillon. No thrombus was formed in the sinus. In another dog he placed an infected tampon within the sinus. There was no thrombosis. In a third dog one-fourth cubic centimeter of a bouillon culture of streptococci was injected into the sinus. There was no thrombosis, and the heart blood was sterile three days later. In a fourth dog, the wall of the sinus was scarified with a scalpel before an infected tampon was applied. This dog died two days later. An abscess was found over the sinus, and there was an extensive thrombosis in the lateral and superior petrosal sinuses. A portion of the thrombus was broken down, and contained streptococci and staphylococci. A pure culture of streptococci was obtained from the heart blood.

Stenger drew the following conclusions from his experiments:

1. The greatest protection against infectious thrombosis is the vessel wall itself. Bacteria which pass through a healthy vessel wall are destroyed in the circulation. The nonmechanical thrombus is preceded by disease of the vessel wall and subsequent change in the blood.
2. Bacteria do not cause thrombosis by settling upon the intima; the thrombus is caused by inflammatory changes in the blood, which are indirectly caused by bacterial invasion.
3. Thrombosis occurs before bacteria enter the circulation.

The infection of the thrombus is secondary.

Haymann infected the superior longitudinal sinus in twenty dogs, and the lateral sinus in six monkeys. He placed a tampon soaked in a culture of streptococci or staphylococci in contact with the sinus wall, and left it in place for varying lengths of time. He reached the following conclusions:

1. Infectious sinus thrombosis is best produced experimentally by the application of an infected tampon to the outer wall of the sinus. The rubbing on of cultures, even after injury to the sinus wall, does not usually produce thrombosis.

2. Bacteria can reach the circulation without the intermediation of a thrombus.

3. Sinus thrombosis usually occurs as a parietal clot, which becomes obturating after a variable time. Rarely, the entire blood column may clot at once.

The length of time between the application of the infection to the outer sinus wall and the beginning of clot formation varies within wide limits. The time from the beginning of the formation of the parietal clot until it becomes obturating also varies considerably.

4. Thrombi may contain bacteria as soon as they are formed, or the bacteria may enter the thrombus secondarily. Bacteria usually enter the thrombus from without, but they may enter it from the circulation. The number of bacteria in a thrombus varies greatly. The ends are usually more benign, but this is not always so. Moderate numbers of bacteria are no bar to organization of the thrombus.

5. Thrombi may remain parietal and organize thus.

6. The growth of thrombi is usually centrally directed. Discontinuous thrombi may occur through the fact that thrombosed dural veins may enter into nonthrombosed areas of the sinus, and thus produce new thrombi.

7. There is a marked tendency to spontaneous healing of thrombi. The healing usually starts early.

8. From the macroscopic appearance of the sinus wall it is impossible to judge the contents of the sinus.

9. Aseptic compression or incision of the sinus produces no thrombosis.

10. Injection of bacteria into the circulation, with aseptic compression or incision of the sinus, produces thrombosis.

Most thrombi are infectious. But a few are not infectious. These latter are called marantic thrombi and are primary. They are located most commonly in the superior longitudinal sinus and occur usually in individuals who are in a very weakened condition. They occur most commonly in very young children and old people. They probably occur as the result of a slowing of the bloodstream and changes in the constitution of the blood. The thrombi are almost always mural and they never suppurate. They either organize or become absorbed. The thrombi may extend into the cerebral veins and produce localized cortical cerebral lesions.

Infectious sinus thrombosis is due either to compound fracture of the cranial bones or to a localized inflammatory lesion in some part of the head. Inflammatory processes in the scalp may cause a thrombosis of the superior longitudinal sinus. Inflammations on the face, in the orbit or about the tonsils may give rise to a thrombosis of the cavernous sinus. The most common cause of sinus thrombosis is suppurative disease in the middle ear and mastoid. This gives rise to thrombosis of the lateral sinus and jugular bulb. Several cases have been reported, of suppurative adenitis in the neck causing a thrombosis of the internal jugular vein, which extended up into the jugular bulb and sigmoid sinus. Injuries to the sigmoid sinus or jugular bulb in the course of a mastoid operation may give rise to a sinus thrombosis.

Thrombosis of the lateral sinus resulting from middle ear and mastoid disease may come about in one of several ways.

1. The inner table of the mastoid over the sinus may be diseased and an abscess form between the sinus and the inner table. This results in an inflammation of the outer sinus wall, which in turn leads to the formation of a thrombus within the sinus.

2. The inner table over the sinus may be diseased and cause an extension of the inflammatory process to the sinus wall without the intermediation of a perisinus abscess. The phlebitis results in a thrombus formation.

3. A thrombus may form in one of the smaller veins of the mastoid process and extend into the lateral sinus.

The pathologic changes in sinus thrombosis are the same as in thrombosis of veins in other parts of the body, with the

exceptions caused by differences in the structure of the sinus wall. Differences in location also give rise to variations in the pathologic changes. The sinuses differ from veins principally in the fact that they have no muscular coat, and that in most cases they are adherent to bone.

The inflammatory changes in the sinus wall consist of thickening of the entire sinus wall due to round celled infiltration, dilatation of the vasa vasorum, and necrosis of some of the cells, especially of the endothelial cells in the intima. There may be smaller and larger abscesses in the sinus wall. There are numerous bacteria in the sinus wall. The thrombus is adherent to the intima. The thrombus usually contains bacteria, but it may be sterile. It may be broken down in places. It may be partly or entirely organized. It may be broken down in parts and organized in other parts. The outer surface of the sinus may be covered with plastic exudate. There may be an abscess between the outer surface of the sinus and its bony covering. When this is the case the sinus wall is **enormously thickened and covered** with shaggy granulations. Sometimes the thrombus breaks down, and a portion of the outer sinus wall becomes necrotic and breaks down, with the result that the abscess within the sinus communicates through the fistula in the sinus wall with the perisinus abscess. In some of these cases the pus may find its way through the mastoid canal alongside of the emissary vein to the outer surface of the skull and cause a localized edematous swelling in this situation, or it may pass through the posterior condyloid foramen and give rise to a cellulitis in the deep tissues of the neck in the region of the posterior cervical triangle.

The inner or visceral wall of the sinus may undergo the same changes as the outer wall. When this occurs there is usually an extension of the inflammatory process to the pia, resulting in the formation of adhesions between the sinus wall, the pia and the surface of the brain. In some cases a diffuse leptomenigitis results. Sometimes the inflammatory process extends into the substance of the brain and gives rise to a brain abscess. This is especially common in the cerebellum.

The saccus endolymphaticus lies in the visceral wall of the sigmoid sinus. When a suppurative labyrinthitis results in a saccus empyema, the infection may spread from the sac-

cus in both directions, giving rise to a sinus thrombosis and a cerebellar abscess.

Sinus thrombosis may cause alterations in the brain tissue and meninges in other ways than by direct extension of the inflammatory process from the sinus wall. The thrombus may extend from the sinus into some of the pial and cerebral veins. Thrombosis of the cerebral veins may result in the occurrence of spots of hemorrhagic softening in the brain. Heilbronn reported a case of sinus thrombosis with general cerebral symptoms. Autopsy showed an extension of the clot from the lateral sinus into the vena magna Galeni and the small basal cerebral veins, with spots of hemorrhagic softening in both optic thalami. In another case of sinus thrombosis there were disturbances of speech. In this case he found multiple small lesions in the medulla. Extension of the thrombus into the pial veins may cause a serous meningitis or an edema of the brain. In a third case of sinus thrombosis described by Heilbronn, there was a sudden onset of aphasia and agraphia after several hours of coma. The next day the aphasia and agraphia disappeared. These symptoms were due to an extension of the clot from the lateral sinus to the large pial veins which surround the temporosphenoidal lobe and drain it. There were no localized lesions in the brain. The symptoms were caused by an edema of the temporosphenoidal lobe which disappeared as soon as a collateral circulation was established.

The inflammatory process which extends from the sinus to the meninges, sometimes gives rise to an involvement of one or more of the cranial nerves. This is especially true of the third, fourth and sixth nerves. The nerves become inflamed as the result of a direct extension of the inflammatory process from the meninges. In thrombosis of the cavernous sinus the inflammatory process spreads directly from the thrombus to the nerves which lie in the wall of the cavernous sinus.

Inflammation of the optic nerve occurs with sinus thrombosis. When the thrombus is in the lateral sinus, the inflammation of the optic nerve is probably due to an extension of the meningitis. When the thrombus is in the cavernous sinus the changes in optic nerve may be due either to the accompanying meningitis or to edema resulting from obstruction to the

circulation.

Thrombi in the sinus may be partial or complete. The partial thrombus is called parietal or mural, and the complete thrombus is called obturating. There is no apparent reason why some thrombi should be parietal and others obturating. Most of the thrombi that come to operation are obturating. All thrombi begin as parietal thrombi, and some finally become obturating. Parietal thrombi are no doubt frequently overlooked at operation. Leutert believes that parietal thrombi occur more commonly with acute otitis and obturating thrombi with chronic otitis. But the experience of most otologists today is that either form of thrombus is apt to occur with equal frequency in acute and chronic otitis.

According to Brieger, "a parietal thrombus in the sinus can only be assumed, when it is demonstrated; but even in cases which are positive anatomically, the proof of the presence of a parietal thrombus must be completed by the further proof that the thrombus is so situated that it took its origin from the ear, and is so constituted that it can produce general sepsis and metastases." He believes, for example, that in cases of otitic general sepsis, in which autopsy shows a small partly organized parietal thrombus attached to the cerebellar wall of the sigmoid sinus, the thrombus is not the cause of the general sepsis. A thrombus of this kind is too insignificant and contains too few bacteria to keep up a general sepsis, and furthermore, a thrombus in this situation is usually not an extension from the middle ear suppuration, but is due to incision and tamponade of the sinus.

The thrombus is most commonly located in the sigmoid portion of the lateral sinus. It varies in size from a fraction of an inch to the entire length of the lateral sinus. It may extend down into the bulb, and even for a variable distance into the internal jugular vein. It may even occasionally reach the upper part of the innominate vein. It may extend upward as far as the torcular, and even cross over into the opposite lateral sinus. It may extend into the superior longitudinal sinus, the occipital, the straight, the superior or inferior petrosal sinuses. It may extend into the mastoid emissary or the posterior condyloid vein.

There may be a primary thrombosis in the jugular bulb,

without involvement of the sigmoid sinus. It is easy to understand how the inflammatory process may pass directly from the middle ear through its floor to the wall of the jugular bulb, especially when the floor of the middle ear is very thin or even wanting altogether. Leutert does not believe that primary bulb thrombosis occurs as the result of extension through the floor of the middle ear. He thinks that it is due to bacteria which enter the bloodstream through the wall of the sigmoid sinus, and passing downward, find a favorable spot for clot formation in the bulb. Here the bloodstream curves and forms a whirlpool. The lumen of the bulb is narrowed at its outlet. The blood current is forced back from the internal jugular vein during deep expiration.

Occasionally the thrombus is located in the inferior petrosal sinus, without involvement of the other sinuses. The veins of the internal ear empty into the inferior petrosal sinus, and suppurative disease in the labyrinth may give rise to a thrombosis of the inferior petrosal sinus. Necrotic processes of the petrous pyramid may also result in a thrombus formation in this location. Schwartze reported two cases, Jansen reported four cases and Beyer reported one case of primary thrombosis of the inferior petrosal sinus. The writer reported one case of thrombosis of the inferior petrosal sinus complicating a chronic suppurative labyrinthitis. In this case, the thrombus extended from the inferior petrosal sinus into the cavernous sinus.

The thrombus may be situated primarily in the cavernous sinus. This occurs as the result of an infectious process about the face, in the throat or in the orbit. A thrombus may extend into the cavernous from the lateral sinus through the superior or inferior petrosal sinus. A thrombus in the cavernous sinus is rarely limited to one side. It usually extends, in a few days, through the circular sinus to the opposite cavernous sinus.

A thrombus may occur in the superior longitudinal sinus as the result of an infectious process in the scalp or nose.

We sometimes find, in operations for jugular resection, that the internal jugular vein is empty and reduced to a thin cord. When this occurs it is sometimes very difficult to find the vein. It can easily be mistaken for a nerve or a piece of fascia. The

reason for collapse of the vein is not very clear. It is generally thought to occur when the thrombus extends down from the jugular bulb into the internal jugular vein past the point of entrance of the facial vein into the latter. But it is difficult to understand why the blood should not pass upward from the subclavian to the lower limit of the thrombus in such cases. It is probable that a periphlebitis and phlebitis of the internal jugular is the cause of the obliteration of the vein.

Kramm and Passow reported several cases of obliteration of the sigmoid sinus without thrombus formation at the site of the obliteration. In these cases a perisinus abscess compressed the sinus until the walls were in apposition. There was an inflammation of the outer wall of the sinus with a thickening of the wall. When the inflammation reached the intima, the latter became adherent to the opposite wall. There was no thrombus formation, because, at the time when the inflammation reached the intima, there was no longer any blood passing through the sinus.

The following are the possible end results of a thrombus in the sinus:

1. The patient dies of general sepsis before the clot breaks down.
2. The clot breaks down in the center, and the pus finally breaks through the outer wall of the sinus, so that the abscess within the sinus communicates with the perisinus abscess.
3. The pus within the sinus breaks through the visceral wall of the sinus and produces a cerebellar abscess or a meningitis.
4. The thrombus organizes and results in obliteration of the sinus.
5. Part or all of the thrombus becomes absorbed, resulting in recanalization of the sinus.

In sinus thrombosis, bacteria pass from the thrombus into the general circulation, where they can usually be demonstrated. The streptococcus hemolyticus and the streptococcus mucosus are the organisms most commonly found. Occasionally other organisms are found. The presence of bacteria in the blood is determined by blood cultures.

Leutert believes that every case of otitis that has a bacteri-

emia is due to sinus thrombosis. Libman believes that there is a bacteriemia at some time in all cases of sinus thrombosis except those that are aseptic from the beginning and remain so. Brieger reported a few cases of pyemia with metastatic abscesses originating from middle ear suppuration, in which postmortem examination showed no thrombus in the sinuses or jugular bulbs. He believes that, although it is possible for an otitic pyemia to occur without sinus thrombosis, yet these are the exception, and the vast majority of cases have a sinus thrombosis. Kobrak reported several cases of general sepsis with otitis, in which no thrombus was found in the sinuses. Haymann, in the course of his experimental work on thrombosis in dogs and monkeys, found bacteremia without sinus thrombosis in a few cases. There seems to be no doubt that cases of otogenic general infection do occur without sinus thrombosis, but they occur very rarely. As a general working rule, we may assume that otogenic general infections are due to sinus thrombosis.

There are several conditions besides sinus thrombosis in which bacteriemia occurs. These are meningitis, tonsillar infections, acute bacterial endocarditis, scarlet fever, typhoid fever, pneumonia and erysipelas.

In cases of sinus thrombosis, bacteria may not be found in the circulation at all times. Sometimes two or three cultures must be taken before bacteria are found. Libman found that bacteria are most apt to be found either during or immediately after a chill.

Multiplication of bacteria in the blood rarely occurs. Libman found that the circulation often becomes free of bacteria within a few hours after the thrombus is removed from the sinus and the internal jugular vein ligated.

When fragments of infected clot are broken off from a thrombus in the sinus and carried into the circulation, they are caught in the pulmonary capillaries and produce metastatic foci in the lungs. When there are free bacteria in the circulation, they can pass through the capillaries of the lung and enter the systemic circulation. Under these circumstances they are more apt to produce metastatic foci in the joints, muscles and subcutaneous tissues.

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INDICATIONS FOR VARIATIONS IN TECHNIC IN
TONSILLECTOMY OPERATION.*

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By way of introduction, permit me to quote from a paper presented by the late Dr. J. R. Fletcher:¹

"When we can agree upon a technic which completely removes the tonsil in its capsule, does not open the aponeurosis of the superior constrictor muscle, does not injure the aponeurosis of the palatoglossus or palatopharyngeus muscles, which conserves every bit of the membrane reflected over the tonsil, which prevents fusion of the three muscles named and leaves a linear scar in a rudimentary fossa, which does not injure the voice and lessens greatly the frequency of the secondary hemorrhage, we will have achieved the ideal, in the light of our present knowledge."

He states, "that it is not a dream but it is being done uniformly by many." However, I fear that when all tonsil operators have agreed upon one technic, the millennium will have arrived. I base this conclusion upon the fact that all tonsils are not alike as regards shape, size, or histologic condition; nor are they situated alike in all throats with regard to other adjacent structures.

I can heartily agree that the ideal result would necessarily have to comply with the above stated conditions; but I do not believe that one technic is applicable to all types of tonsils. Furthermore, it would be a waste of time and effort to use an elaborate technic for a very simple case.

Dr. Greenfield Sluder² states, "that his instrument gives 99.6 per cent perfect results and that the late Dr. Ballenger stated that his modification of the Sluder instrument was good for 70 per cent of all cases." But what is true of these two men and a few others, who declare that their methods pro-

*Read before the Chicago Laryngological and Otological Society, February 19, 1918.

duce almost perfect results, does not prove, to me at any rate, that the great majority of tonsil operators can apply one instrument or one technic to all tonsillectomies. And for the purpose of presenting to you the conclusions I have reached from my own experience in tonsil surgery, I have made a classification of the different types of tonsils with regard to their anatomic and pathologic relationship to the adjacent structures in the pharynx. This is done for the purpose of practical and definite discussion of the subject and is not an attempt at originality. It is as follows:

- (a) The free tonsil.
- (b) Tonsils with firm lymphoid connection to tongue.
- (c) Tonsils with large upper lobe hidden in supratonsillar space.

(d) The submerged tonsil.

(a) The free tonsil apparently has not a definite attachment to the tongue and slight, if any, attachment to the pillars. There is a well defined fossa between it and the pillars, and it protrudes out into the throat, from its pedicle-like attachment to the constrictor, an unhindered free mass of tissue. The pedicle varies in size and may be much smaller than the body of the tonsil. The supratonsillar space is free and there are no occluded crypts.

Quoting Dr. Boot:³ "It can be removed by any method with perfect satisfaction and is the kind that leads the occasional operator to think that he is capable of doing tonsillectomy." Because the pedicle is usually small and the tonsil itself is free, the above statement is undoubtedly correct. Almost any technic will serve in gaining a good result, provided that it is skillfully performed by a competent and experienced operator. There should be no damage to the adjacent structures. Usually the general practitioner, thinking the operation a minor one and not demanding special ability or experience, removes them himself. I have seen some very poor results due, I judge, to the lack of the very talents that he thinks unnecessary to successfully perform the operation.

A few years ago these were about the only tonsils removed, and usually the operator removed them because they were obstructing the oropharynx to such an extent that the patient demanded that it be done. Then he used a guillotine or a

McKenzie tonsillotome, placed the fanestra over the tonsil, shut his eyes and squeezed. It made very little difference to him whether he removed part or all of the tonsil or damaged the pillars or cut off the uvula. Unfortunately for the public, this method is still being used by some operators.

The Sluder instrument is now used by a great many men with very satisfactory results. In competent hands it is safe. Nevertheless, it has its shortcomings, and these are soon discovered after using it for a while. Makuen⁴ states that an ideal intracapsular tonsillectomy can be done with this instrument if used in conjunction with a snare. He grasps the tonsil with the instrument, using a dull blade and the Sluder dislocating technic, but makes no effort to crush its attachment. Instead he slips a snare wire around the tonsil and between the pillars and the instrument with which he squeezes out the tonsil. In deciding on this method of technic, I believe that he has definitely pointed out the particular weakness of the instrument.

Of all the instruments now used for this type of tonsil I believe the snare is the best, safest and most practical. Any snare will do, but the one that will place the wire snugly around the base of the tonsil and very slowly crush the attachment is certainly the one to use. My preference is the Beck instrument.

The free tonsil is not one which it is necessary to remove by dissection. When its removal is so easily and completely performed with one instrument, it surely is a waste of time and effort to operate by the former method. A deplorable result frequently happens when unskilled and inexperienced men attempt to apply a complicated technic to these cases.

(b) In this type the tonsil is attached to the tongue by a lymphoid tissue connection. It has been my experience, and I find the experience of other men, that if the tonsil and this lymphoid connection are not sheared off close to the base of the tongue you have what is apparently a return of the tonsil. What really happens, however, is that the lymphoid tissue proliferates and pushes up into the evacuated fossa, filling it with a lymphoid mass. I have had a case in which it was necessary to remove this lymphoid mass twice after a tonsillectomy. And other cases have occurred where it was neces-

sary for me to remove this mass once. This followed tonsillectomies where I used a Sluder or snare leaving a small pedicle of tissue in the infratonsillar space. So finally I decided that these cases could not be operated satisfactorily with one instrument.

I think that in these cases the tonsil should be carefully removed by dissection. No other method will do as well, because none of them will deliver the tonsil in toto. The method used by Dr. Justus Matthews comes nearer my ideal of a perfect tonsillectomy than any other, unless it be the methods used by Beck, Ballenger or Fletcher. The general idea of dissecting from the upper pole down to the tongue, where the snare is used to crush off this connection, is common with all four men. They differ only in their methods of dissection. This really makes little difference, if skillfully performed, whether it is sharp, dull or finger dissection. The ideal result is the removal of all the tonsil and lymphoid tissue up to the tongue without removing any of the pillars or adjacent tissues.

In my operations I use the following technic: Grasp the tonsil with the Ballenger fixation forceps and pull it out and down. Make an incision between the tonsil and upper part of the anterior pillar about an inch in length so that it is possible to introduce the index finger. It is now easy to free the upper part of the tonsil from the pillars and all of it from the fossa. Where the pillars still adhere to the tonsil they are gently separated, if this is thought necessary, and the operation finished with the snare.

(c) One may be easily deceived regarding the size of the third type, because of the fact that its mass is hidden up between the pillars in the supratonsillar space. This lobe may constitute as much as one-half of the entire tonsil mass and only during inflammation show any evidence of its presence. In many throats the meeting of the pillars is as low as the middle of the tonsil. The plica tonsillaris may assist the pillars in encysting the upper and anterior parts of the tonsil; covering the crypts and mucous glands, damming the drainage of the supratonsillar fossa and the space between the anterior pillar and the fossa. Very often its attachment to the tonsil is so intimate and firm that it seems to be part of it, and it is

difficult to distinguish just where the anterior pillar ends and the plica commences.

As a rule these are the cases that are prone to tonsillar abscess. However, you may find encysted pockets of pus giving no local evidence of their existence but causing pathologic conditions in distant parts of the body. G. E. Shambaugh⁵ states "that it is also a very frequent experience to discover distinct evidence of chronic infection in tonsils; as, for example, the presence of pus which can be expressed from the tonsil, where there has been no history of acute attacks, of acute tonsillectomy or of sore throat."

Even when gargling, these tonsils do not show their true size, and it is only when they are grasped with a tenaculum and pulled out and down that the outline of the upper pole shows through the anterior pillar. Only then are you able to gain a definite idea of their size and location. It is the rule to find the crypts filled full of foul smelling, cheesy material.

Regarding their removal, I will venture my opinion that this also is not a one instrument operation. The hidden upper pole must be dissected from its attachment very carefully. In fact, whether it is removed by sharp or dull instruments or by finger method, it requires the best of surgical skill to do this work properly. Many a blunderer may get away with an amputation, or even a laparotomy, but it takes real surgical ability to remove this tonsil without damage to other parts of the throat.

(d) The submerged tonsil, as the term would imply, is buried in the tonsillar fossa, with only a small part of its surface exposed. This renders it very difficult to determine its true size. The crypts, mucous glands and the fossa anterior, superior and posterior, cannot drain freely, if at all. The result is that peritonsillar abscesses are frequent, as this condition is ideal for encapsulation of detritus with resulting infection and pus formation. As a focus for infection this tonsil has as a competitor only the "hidden upper lobe" type.

Allow me to state that no tonsil of this type is ever needlessly taken out, and even if no encysted pus or infected detritus is found, which is extremely rare, it will not be long until this condition will obtain. Any way, you will have removed only a bit of lymphoid tissue that sooner or later

will cause the patient trouble, and which, up to date, has not been proven definitely to have any function, either as a bactericidal agent, internal secretory organ or pulley for the pillars to glide over while performing their part of vocalization.

It can be taken out very nicely in one of the three ways: Dissection, Sluder method or with the Beck instrument. The Sluder method works very well in selected cases, although there is always the danger of removing parts of the anterior pillar or at least some of the mucous membrane covering it. I have used the instrument in a great many cases with good results, but I must admit that I injured the pillars in several of my earlier Sluder tonsillectomies. The edge of the blade is difficult to keep in the proper condition. If too sharp, you may injure the pillars; if too dull, you may be forced to lay aside the instrument and do a dissection. And I have found that when the opening in the instrument is not smaller than the tonsil you may get only part of the mass, necessitating the removal of the balance by some other method. This is no doubt due to bad technic as well as an unsuitable instrument, but I have seen this happen to the best operators.

It is especially important that the blade be just the proper sharpness and to be sure that you have engaged nothing but the tonsil when operating on children, as their tissues are extremely soft and pliable. Otherwise you may do irreparable damage.

I believe that the Beck snare is the best instrument for tonsillectomies of this type in all cases where a one instrument method is warranted. It has all the good qualities of the Sluder and none of its faults. The No. 8 snare wire, which is usually used, is neither too sharp nor too dull. It has that much desired quality of dissecting its way between the tonsillar capsule and the aponeurosis of the muscular tissue. Like electricity, it seeks the easiest way. And when the loop is slowly and carefully tightened there need be no fear that anything besides tonsil tissue will be removed.

One great advantage of the instrument is in being able to lock it after the tonsil is engaged for the purpose of investigating just how much tonsil and other tissues you have caught in it. Then you are able, by slowly turning the screw, to get the utmost of the dissecting ability from the snare wire as

well as a minimum of hemorrhage.

About twenty-five per cent of this type are so situated that it is next to impossible to get them out with either of the above mentioned instruments, and one is forced to dissection. The tonsil in these cases is long and broad, comparatively flat and with very little of the mass exposed. It is so securely bound down by the pillars and the plica that it is difficult to engage even with a tenaculum. So it is necessary in these cases to use the greatest possible care, as injuries to the adjacent structure can happen to the most skillful operator. Therefore rapid fire work should not be attempted and patience should be substituted for speed.

In conclusion, allow me to say that no one would welcome a one instrument operation for all types of tonsils more than myself, if it were possible. But I do not think it is. Each case has its own anatomic and pathologic peculiarities that make it necessary for different methods and different instruments to be used. These varying conditions found demand deliberative study, the selection of a rational method for each case, and perfect technic to gain a satisfactory result. That is what the patients are paying for, will expect to get, and is what they should have.

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XXVIII.

REACTIONS OF THE NORMAL LABYRINTH: RE- CENT EXPERIENCE IN THE UNITED STATES AVIATION EXAMINATIONS.*

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LOS ANGELES.

There has never been any accepted routine for making a functional examination of the activity of the vestibular nerve. Otologists, as a rule, have developed individual schemes of testing the canal reactions in accordance with the investigations of Bárány. In examining the candidates for the United States Aviation Service a plan of procedure for testing the vestibular reactions was originated by Major Isaac Jones, United States Army, acting under Colonel Lyster, and this procedure has been carried out in a definite way at all the United States aviation examination stations. After this work is finished it is possible that a definite routine for examination of the vestibular nerve will be established that will be followed by otologists in their private practice.

The opportunity to test out in aviation work a large number of normal men gives to us who are engaged in otologic work great assistance in determining **how much to depend** upon abnormal reactions in patients who are sent to us with suspicion of labyrinthine or retrolabyrinthine disease. One is certainly impressed by the regularity in the normal reaction responses to these tests in normal men. But, as in so many other things, no test or series of tests is infallible. Later in this paper I will speak of a few cases where abnormal reactions were found in men who were apparently normal—that is, perfect hearing was found and perfect general condition existed; yet the vestibular reactions, as found by douching as well as by turning, were abnormal.

Normal Vestibular Reactions.—It is not my intention to

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take your time in reviewing these reactions, for the reason that they are well known to you. I wish to go over the tests as standardized by the United States Army Aviation Service. This service has a routine that is carried out at all the stations throughout the United States. A standard revolving chair with a foot-stop pedal is used—the Bárány chair, improved by Jones. A stop-watch is used to accurately time the reaction. The applicant is seated in front of a window with no objects in the foreground, so that distant vision is secured. The steps of the tests are as follows: (1) Spontaneous nystagmus is looked for, with eyes forward, with eyes deviated to the right, with eyes deviated to the left. (2) The after-nystagmus is timed (by stop-watch) after revolving ten times in twenty seconds to right and again after revolving to left. The head should be upright with the imaginary line joining the external auditory meatus, and the external canthus of the eye parallel to the floor. The amplitude of the nystagmus is noted. (3) Spontaneous past-pointing with each arm is tested, with eyes closed. (4) The applicant is then turned ten times in ten seconds to the right and the past-pointing with each arm is tested. The same is done after turning to the left. (5) The falling reaction is tested by revolving the applicant five times in ten seconds, with the head forward on the knees during the turning, the reaction by falling being seen when the applicant sits upright. If any abnormal reactions are found the vestibular reactions from douching with water 68 degrees are excited, in one ear and then in the other, as follows:

Right ear syringed with head upright (the line joining the external auditory meatus and external canthus of eye must be parallel to the floor). (1) The length of time to the onset of nystagmus is reported. (2) The past-pointing with each arm (eyes closed) is at once tested. The head is then turned backward 90 degrees. (4) The nystagmus is seen to change from rotary to horizontal in character. (5) The past-pointing with each arm is taken with the head in this position. (6) The patient is then asked to stand upright with the eyes closed and the falling reaction noted. The left ear is then syringed and the same steps just given are repeated.

In testing over 800 applicants at our station we have made some observations which may be worth reporting to you. It

should be said at the beginning that all these vestibular reactions, supposedly normal, did occur in such an overwhelmingly large percentage that there seems to be no doubt whatever of the value of this definite scheme of carrying out the Bárány series of tests.

(1) As to spontaneous nystagmus it was not once found.
(2) As to after-nystagmus from turning, we found that the average duration in 282 applicants was 23.49 seconds after right rotation and 24.17 seconds after left rotation—15 to 35 being the extremes in about 99 per cent of the applicants examined. Ruttin quotes Leidler's case report of complete absence of rotation after nystagmus without explainable cause. No such case occurred in over 800 normal men examined at our aviation examination station. One can only doubt that Leidler's case was a normal one.

More important than the duration of after-nystagmus is the point of the difference in seconds in after-nystagmus from right turning and left turning, because in diseased cases the rotation test is chiefly valuable because of the difference in after-nystagmus as shown on right rotation and left rotation. To show this point, the examinations of the first 200 applicants were considered. It is interesting to see that the average difference in seconds in after-nystagmus from right rotation and left rotation was $2\frac{1}{8}$ seconds. In only two of the 200 cases was there a difference of 10 seconds, and in no case more than 10 seconds between the right and left rotation after-nystagmus. In one of these cases the result was 20 seconds and 30 seconds, and in the second case the result was 25 seconds and 30 seconds' duration of after-nystagmus from right to left rotation. Such results in cases suspected of diseased conditions would hardly make one suspicious, because the duration of after-nystagmus is entirely too great to make one suspect an inactive canal or nerve on either side. These two cases were the only two where there was much difference in after-nystagmus from right to left turning. For example: In only eleven of the 200 cases was there a difference of over 5 seconds. If more than 10 seconds' difference occurred one should be suspicious and resort to the caloric test. So that it seems reasonable to conclude that this test, if applied exactly as required by the Army Aviation Service (10 times in 20

seconds), will rarely show a difference of over 10 seconds in right and left rotation after-nystagmus.

Some points should be emphasized in this test. The patient should hold his head in the correct position as given above, so that the horizontal canal is really horizontal to the floor. He should be turned exactly ten times in twenty second. While we think we learn to know the exact speed required without timing with the watch, we are apt to make an error unless we use a watch, and especially a stop-watch. We found that the best plan is to start the stop-watch on beginning to turn, and after turning ten times, note whether the second hand is at 19, 20 or 21, and time the after-nystagmus from that point. This enables one to be sure of turning ten times in twenty seconds, even to note after five turns whether you are turning too fast or too slow, and one can get the exact time of after-nystagmus by subtracting the 19, 20 or 21 from the number of seconds recorded when watch is stopped at the end of nystagmus reaction.

Spontaneous past-pointing was not found. Tendency to past-pointing was often seen to be due to a tight fitting coat (which should be removed) or to a large muscular chest, which, of course, makes one tend to point a bit to the right with the right arm and to the left with the left arm. The one to be tested should be shown just how the pointing test is to be done by the examiner going through the test. This will save much time and much confusion, and often prevents having to repeat the test. The arm should be kept extended, raised not too quickly to a vertical from the shoulder, and slowly but steadily and without muscular tension come down to touch the examiner's finger with his forefinger. He should be cautioned not to go too fast, nor to stop where he thinks he should, but continue letting the arm "drift down," even if he misses the finger of the examiner. It is often the last of the "drifting down" when the past-pointing will be most marked. Finally he should be told to remember to keep his eyes tightly shut until told to open them. The examiner on his part should hold his right hand, with the index finger extended, supported by the left hand, both elbows against his hips to keep a steady position; otherwise he will involuntarily

move a bit, especially if he is watching the down stroke of the one being tested.

(4) Past-Pointing After Turning.—The above precautions against error are to be noted. The army requires turning ten times in ten seconds, which for a man of medium weight, is about as fast as one can turn. It was not infrequent to find at this rate that such loss of equilibrium occurred that the applicant's arm, especially his left one, would be brought down without any muscular control, and so fast that it might past-point or cross-point badly on the first stroke. An unnecessarily abrupt stop would produce by its shock a similar extreme loss of equilibrium, rendering the test uncertain. A repetition often a bit more slowly or without the extreme shock of the stop on the tenth turn would often cause the usual normal response. Nevertheless, a stop device to lock the chair is an absolute necessity, and no past-pointing is accurate or consistent when a revolving chair without the locking pedal is used. The past-pointing reaction was elicited according to rule in about 90 per cent of those examined. The average number of times of past-pointing in 283 cases was as follows: Right arm, 2.22; left arm, 1.91 (after right turning); and right arm, 2.18; left arm, 1.96 (after left turning). One good past-pointing movement, however, is sufficient to indicate the reaction. Of 700 applicants 47 cross-pointed with one or both arms on turning for past-pointing, as follows: On right turning, 5 crossed with right arm, 26 with left arm. On left turning 18 crossed with right arm, 21 with left arm. The right arm crossed 23 times to 47 with left arm. This seems to us to be explained in this way: There is in right handed men a better control over the right than left arm, and during the loss of equilibrium that is extreme in a certain proportion of those turned, there was a greater loss of control over the left than the right arm. The fact that only 5 of the 47 cross-pointed with the right arm on right turning is to be explained, we think, in this way: that for the right arm to cross-point on right turning (that is, to cross the chest to the left), there is interference because of the large muscular development of the chest in right handed men. The following conclusions seem warranted: (a) In turning for past-pointing we must allow in some individuals or the extreme loss of

equilibrium that results, in which case the cross-pointing is not an evidence of disease but possibly a hypersensitive condition of the end organ in the labyrinth. (b) In all cross-pointing we should remember that the left arm is more apt to cross-point than the right arm, especially on right turning.

(5) The Falling Reaction.—This, too, should be explained by the examiner by a demonstration and the following points emphasized: (a) The applicant must be warned not to open his eyes until told to do so; (b) To sit upright without strain when told to do so; (c) to avoid any muscular control resisting the tendency to fall. The falling reaction was found to be abnormal only 11 times in 257 times on right turning, and 10 times in 259 times on left turning. Many times where the reaction obtained was abnormal it was found on retesting that the applicant was resisting the induced tendency to fall.

In conclusion permit me to cite a few of the relatively small number of cases where abnormal reactions occurred both from turning and from douching. These are interesting because the applicants were young, apparently healthy young men with normal hearing. The hearing tests (watch or whisper) demanded by the United States Army Aviation Service are inadequate, so far as ruling out unilateral nerve deafness. The writer for his own purpose therefore made tuning fork tests of applicants who showed any reduction in hearing to watch or whisper, as well as many applicants with apparently normal hearing. This tuning fork test as practiced was as follows: The applicant was tested in a quiet room, apart from others. The C₂ 512 d. v. fork was selected for routine use. Bone conduction and air conduction was each taken by a stop-watch and recorded thus: A. C. (normal or + or — blank sec.) exceeds B. C. (normal or + or — 1 blank sec.) by blank seconds. By this test I wished to determine, for my own satisfaction, in a series of cases what was normal bone and air conduction for this fork as well as the Rinné in seconds. I believe that this test fairly well proved that there was no nerve deafness in the cases where abnormal labyrinthine reactions occurred.

CASES WITH ABNORMAL REACTIONS.

No. 9. Vestibular reactions, as follows: Nystagmus after right turning, 21 seconds; after left turning, 21 seconds. Past-

pointing: After right turning, touches with right arm, past-points three times with left arm; after left turning, past-points two times with right arm; two times with left arm. Falling reaction normal after right turning; normal after left turning. On account of failure to past-point with the right arm after right turning, this applicant was douched, with the following result: Right ear, water 68 degrees, nystagmus, rotary, appears after one minute and nine seconds; past-points with each arm normally. Head bent backward 90 degrees, nystagmus changes to horizontal; past-points normally with each arm; when stood erect, falls normally. Left ear douched in the same manner, reaction appeared in one minute and four seconds and all responses normal. As the douch test for each ear produced normal reactions, this applicant was passed.

No. 14. Vestibular reactions, nystagmus after right turning, 25 seconds; after left turning, 24 seconds. Past-pointing, after right turning, one time with right arm, cross-pointed with left arm; after left turning, touched with right arm, touched with left arm. Falling reaction after right turning, none; after left turning, normal. This applicant was douched with absolutely normal responses from each ear, and accordingly was passed.

No. 15. Vestibular reactions from rotation were all normal, except that the after-nystagmus was of short duration, ten seconds after right turning and thirteen after left turning and of small amplitude. He was therefore douched with the following results: Right ear, 68 degrees, rotary nystagmus appeared after three minutes (feeble response); no past-pointing with right arm, fair past-pointing with left arm. On bending head 90 degrees backward, the rotary nystagmus changed to horizontal, but no past-pointing with right arm, fair past-pointing with left. Falling reaction subnormal. Left ear, douched, no response after six minutes with water at 68 degrees. Past-pointing with right arm, but not with left arm. Head then bent backward 90 degrees, whereupon horizontal nystagmus appears and past-points with right arm but not with left arm. Falling reaction, subnormal. Hearing test, normal. Result: rejected for flying, recommended for balloonist.

No. 16. Vestibular reactions, as follows: Nystagmus, after

right turning, 40 seconds; after left turning, 40 seconds. Amplitude of each is large. Past-pointing, after right turning, five times with right arm, five times with left arm. After left turning, cross-pointing with right arm, cross-pointing with left arm. Falling reaction, normal after right and after left turning, with nausea. Recommended for balloonist because of hypersensitive condition.

No. 100. Vestibular reactions, nystagmus, after right turning, 25 seconds; after left turning, 29 seconds. Past-pointing, after right turning, right arm, three times; left arm cross-pointing; after left turning, right arm, two times; left arm, two times. Falling reaction, after right turning, subnormal; rotary, after douching 38 seconds (water 68 degrees), past-after left turning, normal. Douched: Right ear, nystagmus, pointing with right arm normally, but no past-pointing with left arm. With the head back 90 degrees, nystagmus, horizontal, but no past-pointing with either arm. Falling reaction, subnormal. Left ear (douched), nystagmus after 42 seconds, past-pointing with right arm and with left arm. With head back, nystagmus, horizontal; past-pointing with each arm normally. Falling reaction normal; no nausea. This candidate was rejected because of the above abnormal reactions.

No. 112. Vestibular reactions, nystagmus, after right turning, 17 seconds; after left turning, 20 seconds. Past-pointing, after right turning, right arm, two; left arm, two. After left turning, right arm, three; left arm, cross-points. Falling to right, normal; to left, normal.

Douched: Right ear, no response after three minutes thirty seconds. No past-pointing with either arm. Head back (90 degrees), nystagmus horizontal appears. No past-pointing with either arm. Falling, normal. Left ear, rotary nystagmus faint after one minute thirty seconds. Past-pointing, none with right arm; yes, with left arm. Head back, horizontal nystagmus; no past-pointing with right arm, faint with left arm. No falling reactions. Middle ear normal. Hearing normal to watch and whisper, and normal bone and air conduction with C₂ fork. Result: recommended for balloonist, not for flying.

It is useless to detail other cases with abnormal reactions. The above gives a fair idea of the abnormal cases. It is not

my purpose to attempt to explain these abnormal reactions. On the contrary, they are so inexplicable by our knowledge of what reactions do occur in diseased cases that one is justified in believing that they could not possibly mislead one into incorrect diagnosis.

XXIX.

THE REPORT OF A CASE OF NEURITIS OF THE EIGHTH NERVE INVOLVING BOTH BRANCHES FROM A FOCAL INFECTION IN THE APPENDIX.

BY GEO. W. MACKENZIE, M. D.,
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So far as the salient symptoms—i. e., vertigo, equilibrium disturbances and impairment of hearing are concerned, the case I am about to report is no different from many others the otologist meets with in private or hospital practice. Generally speaking, the symptoms and findings of eighth nerve neuritis, both as to the location of the lesion and the degree of involvement, are sufficiently characteristic as to permit of a ready diagnosis by the otologist who makes free use of up-to-date methods. When it comes to determining the particular etiologic factor behind the neuritis, however, the problem is not so easy. There is no problem in medicine more intricate and interesting than the study of the etiology of neuritis, for the nerves can become inflamed from a greater number of causes than any of the other tissues of the body; besides, the greater susceptibility of the eighth nerve over that of the other cranial nerves tends to enlarge still more the number of possible factors that can be responsible for inflammation of this particular nerve. Fortunately for us, the vast majority of bilateral cases are due to syphilis in one of its stages, and antisiphilitic treatment, if early begun, leads to most excellent results. The contrary holds true in the unilateral cases. It is in the unilateral cases that we find our greatest difficulty, not in locating the lesion or determining the intensity of the neuritis, but in ascertaining the cause or causes behind it, and unless this is known, the treatment must be more or less hit or miss and unsatisfactory.

The case, H. G. G., male, English by birth, age forty-nine years, occupation lumberjack for a number of years in Cana-

da, but recently retired. He was referred, by Dr. W. D. Fellows, of Philadelphia, June 19, 1916. Previous to his present illness the patient had experienced the best of health. History of present illness: The patient complains of having suffered from vertigo and nausea off and on for the last eight years. During the last year and a half he has been comparatively free, but recently the vertigo has been quite pronounced, having as many as two severe attacks in a day. These attacks last from two to three hours, and with them there is marked nausea and vomiting. The attacks come on at any time of the day or night. During the attacks he has the sensation as though he was being spun around rapidly, and the outside world seems to be moving around. He claims to have fallen in some of the more severe attacks, and when he does fall it is always to the right side. He claims that the right ear is of little use to him because of noises and deafness. The noises resemble the blowing off of steam; occasionally it is like the jingling of tools. He has never had any pain in the ear but experiences the sensation as though there was a bubble of water in it. He has never had any trouble with his left ear.

He was treated in London a few years ago by inflation, with apparent improvement. He was recently treated by a Philadelphia ear specialist, who likewise inflated the ear, but with no results. He had a submucous resection of the nasal septum performed by Dr. H. M. Goddard in the spring of 1916, with the hope of improving his ear condition, but without results. He complains of what he believes to be catarrh of the nose and denies having had any throat trouble. He suffers with more or less pain and stiffness in the back of the neck, especially on the right side, and with a feeling as though the head was too heavy for the neck. His principal complaint and the one for which he seeks relief is the intense vertigo and nausea.

The functional hearing test revealed the following findings: On the right side, conversational voice, four meters; whispered voice, seventy-five centimeters; acoumeter, thirty centimeters. Schwabach slightly shortened, Rinne positive, but less so than normal. C_1 slightly shortened, C_4 normal (?). Air conduction for the middle tone fork was shortened. On the left side conversational voice, whispered voice, acoumeter, Schwabach.

Rinné, C₁, C₄, air conduction were all normal. The Weber test was referred to the left side.

The patient observed that during the tests the forks sounded as though they were of a higher pitch on the left than on the right side. Furthermore, the patient was somewhat uncertain in his answers when testing the right side because of the presence of subjective noises on that side.

Otosopic examination revealed on the right side the membrane intact, brilliant and sufficiently translucent to permit of a view of the long process of the anvil. The hammer handle was in normal position, indicating the absence of retraction or bulging. The membrane moved freely and normally with the Siegle instrument, but less than normal during inflation with the Politzer bag, suggesting a relative obstruction in the eustachian tube.

The findings on the left side were practically the same as those on the right, with the exception that there was freer mobility of the membrane during inflation.

Rhinoscopic examination revealed a moderate deviation of the septum to the left side. The middle turbinate on that side was not visible prior to shrinking the mucous membrane, because of the septal deviation. The mucous membrane on both sides was generally relaxed, but of quite normal color. After shrinking with 20 per cent cocain solution, the greater part of the turgescence disappeared, revealing a moderate degree of hyperplasia along the inferior edges of both inferior turbinates. There was no gross evidence of sinus disease on either side.

Mouth and throat examination revealed nothing especially wrong. The teeth appeared to be in normal condition, the tonsils were small and firm, while the crypts were free of deposits when compressed with the pillar retractor. There was the slightest evidence of secondary catarrhal pharyngitis. With the Holmes nasopharyngoscope both eustachian orifices appeared the same and normal, in spite of which, after cocain anesthesia to the right tube followed by gentle probing with No. 4 Yankauer sound and inflation, the patient claimed relief from the discomfort previously felt in the right ear.

He was then tested for equilibrium disturbances, with the following results: Slight hesitancy and unsteadiness in the

gait with eyes closed, combined with a tendency to swerve to the right, which was not present with the eyes open. Owing to the patient's general anxiety and dread of being upset, some of the more severe tests were postponed.

Examination of the eyes for nystagmus showed the slightest degree of spontaneous rotary nystagmus to the left when looking straight ahead. Incidentally it was noted that the right pupil was a trifle larger than the left; however, both reacted promptly to light, accommodation and convergence. The deep muscular reflexes were prompt and of normal amplitude. No surface anesthesia or analgesia was present in the face, neck, upper chest region, arms, hands, legs or feet. The remaining parts of the body were not tested.

He was directed to report a few days later. In the meantime a Wassermann test was made from the patient's blood, and the report received from the Philadelphia Clinical Laboratory, under date of June 23, 1916, was that the Wassermann reaction was negative.

On June 22nd the patient reported for further study. While in the waiting room, his wife, who accompanied him, knocked at the door to tell me that Mr. G. was in the midst of a severe attack of vertigo which had come on a few minutes before. I hastened out to see him and observed the presence of an intensive rotary nystagmus to the left side, of wide excursions. He was helped to a couch in another room and watched closely. In spite of the intensive vertigo he did not vomit, but felt as though he might. This attack gradually subsided, so that after an hour's rest the nystagmus, although still present, had diminished perceptibly. I instructed his wife to keep him on the couch in a lying posture for a still longer time, so that in all he remained there for three hours. When he finally got up, he claimed to be feeling fairly good.

In describing the attack, he told me that it was less severe than many others he had had. Judging from the intensity of the nystagmus, the vertigo must have been very severe, for the eyes were jumping at a rate comparable with the first few seconds following the turning tests. He claimed that the attack, like previous ones, was accompanied by a feeling of stiffness in the neck and an increase in the noises in the right ear. He complained also of a tight feeling around the head.

more especially in the frontal region. He claimed that this attack in the office was the third he had suffered during the last fourteen hours.

It was decided not to do much in the way of a further ear examination that day, and the remaining time was spent on the examination of the eye grounds, which revealed a slight overfilling of the veins in the retina of the right eye. They were not, however, unduly tortuous. The disc appeared to be sharply defined, the physiologic cup normal in size and depth but somewhat poorly defined. The arteries were markedly streaked and surrounded with connective tissue on the disc but not beyond. No changes were noticeable in the macular region or elsewhere in the retina.

The ophthalmoscopic picture of the left fundus was practically the same as that of the right, with the exception that the veins appeared to be less full. The vision with the correction that he was wearing was 6/6 full in each eye, taken separately. On account of his improved condition over that of some time before, another test of the hearing function was made, which resulted in practically the same findings as on the previous visit.

His next visit was on June 26th, when he reported that on the day following his last visit he did not have an attack of vertigo, but on the day after—that is, on the 24th—he suffered two attacks, but less severe than the attack on the 22nd. He claims to have observed that the attacks are prone to come on after reading some length of time.

At this visit (June 26th) he recalled that he had been placed on a strictly milk diet for six weeks during the early part of the year, and for this entire period he was free of vertigo, and after stopping the milk diet the vertigo returned. He told me, further, that he suffers with habitual constipation, but during the period that he was on the milk diet the constipation was corrected, and that since quitting the milk diet he is as constipated as he was before going on this diet.

Dr. Weston D. Bayley, of Philadelphia, by whom he was treated a few months ago, thought that perhaps there was some form of stomach or bowel trouble responsible for the patient's vertigo, and accordingly sent him to Dr. Thomas Bradley for a comprehensive study of the case from that

angle. Dr. Bradley made a careful analysis of the stomach contents after test meals and had the stomach X-rayed by Dr. Walter C. Barker to note its behavior during the digestion of a meal containing bismuth. In spite of the negative findings by Drs. Bradley and Barker, Dr. Bayley contended that there was a strong probability of something wrong in the gastrointestinal tract which was responsible for the vertigo.

At this time (a few months before I saw the patient) he was also under treatment by an ear specialist, who told him that he was nervous and overestimated the severity of the attacks. According to the wish of the patient and because of the apparent relief obtained on the previous visit, the right eustachian tube was treated with a No. 4 Yankauer probe, followed by inflation. There was a favorable response and the patient expressed himself as feeling "elated."

On June 29th the patient reported that on the morning following his last visit he suffered a mild attack of vertigo which passed off in about half the usual time and that he has had no other attacks since. From this time on the patient visited me for several months at more or less regular intervals (semi-weekly). On each of the visits some additional information was obtained in the way of history and findings. Among other things, tests of the hearing and static function were repeatedly made, as well as tests for visual acuity, visual fields, eye muscle tests, blood tests and roentgenograms.

From the standpoint of symptomatology it was learned that the patient complained of poor memory, occasional numbness in the right side of the face, a sensation of internal fullness, excessive fullness, bloating in the stomach and bowels, with occasional eructations and the passing of excessive gas. It was the gastrointestinal symptoms that prompted Dr. Bayley to send the patient to the stomach specialist, and which, as we shall learn later, had some foundation in the chronic infection in the appendix, which since its removal have cleared up with many of his other symptoms.

Careful tests of his visual acuity made on the 22nd of June and on several occasions since, revealed 6/6 full in each eye separately. The fields of vision were taken first on June 22nd and on one or two occasions since, and the results were normal findings in each instance. Tests for paresis of extra-

ocular eye muscles were made with the red glass before one eye, which resulted in the patient seeing but a single image in all fields. The Maddox rod test revealed no heterophoria.

Analysis of the urine made at the Philadelphia Clinical Laboratory revealed a normal amount for 24 hours, normal color, clear consistency, acid reaction, specific gravity 1025, the absence of sugar, albumen, and casts.

Tests of the static labyrinth and nerve were made after the galvanic method on several occasions. The first test was made June 19, 1916, at which time the right side reacted to the cathode with a current strength of five milliamperes and with the anode to five milliamperes, the left side to the cathode with five milliamperes and to the anode with five milliamperes.

This was during a visit when the patient was comparatively free of vertigo. Tests were not made on any day when the patient was complaining especially of the vertigo. One of the tests made a day or two after suffering intensive vertigo, the reaction was found to be less evenly balanced on the two sides and required stronger strength of current on the right side; for instance, on November 16, 1916, the right side reacted to the cathode with a current strength of eight milliamperes and to the anode with eight milliamperes, while on the left side there was positive reaction to the cathode with four milliamperes and to the anode with six milliamperes. It was noted that the reactions fluctuated with the patient's condition, but at no time was there failure of reaction to galvanism when applied to the right side.

The roentgenologic reports are quite interesting and, therefore, I will report them verbatim:

"The accessory sinuses leading from the nasal cavities are all very large. They cast clear shadows and the two sides compared with each other show that there is no thickening nor retained secretions. The nasal septum seems to occupy the median line. The turbinated bones and bodies seem perfectly normal. On the left side they occlude the whole nasal cavity, while on the right side there is more free space.

"The mastoid cells on either side are large and clear cut. Comparing the petrous portions of the temporal bone, the right side shows the arcuate eminence to be much more prominent. This prominence corresponds to the superior semi-

circular canal. In the stereoscopic plates the superior and posterior semicircular canals show distinctly, the arcuate eminence is very transparent. The cellular appearance is due to the mastoid cells showing through. There is a denser eminence near the base of the temporal bone which corresponds to a position above and a little beyond the cochlea. Considered in conjunction with the clinical findings, there is an indication of a tumor of the right petrous portion of the temporal bone at or near the superior semicircular canal. Considered without the clinical evidence, this overgrowth might be an anomaly."

Prior to my having received this report from Dr. Barker, I had decided to put the patient on potassium iodid in material doses, notwithstanding the negative Wassermann finding. Under this treatment the patient improved very materially so that by January, 1917, I decided to have further roentgenologic examinations of the right temporal bone with the object of proving that the condition might be a gumma, in which case the eminentia arcuata, at least theoretically, should be smaller in size. Dr. Barker's second report on January 12th reads as follows:

"Stereoscopic examination of the petrous portion of the temporal bones taken anteroposteriorly and laterally showed the eminentia arcuata is more prominent on the right side than on the left, and by careful measurement I can find no difference in the size from the examination made on July 15, 1916.

The posterior tip as it appears on the later roentgenograms is not as sharply outlined as in the former examination. It is not possible to say whether this would suggest a breakdown or a slight change in the angle of reflection, but I think it is due to a slight change in the angle. The semicircular canals are still clearly outlined, indicating no encroachment upon their lumen."

On March 20, 1917, I received the following report of a third examination made by Dr. G. E. Pfahler, of Philadelphia, which reads:

"The teeth show an abscess completely surrounding the roots of the left lower molar. I think this is probably a pyorrhea pocket that has extended downwards.

There is also an apical abscess or granuloma at the apex of the left lower second bicuspid. There is an abscess at the apex of the right lower first molar, with a pyorrhea pocket under the anterior surface of the crown.

There is a pyorrhea pocket extending deeply between the right lower bicuspids.

In the right upper jaw there are pyorrhea pockets extending down along the roots of the remaining molars, and a small abscess at the apex of the left upper tooth to which the bridge is attached, which, I think, is the first bicuspid, and a pyorrhea pocket extending almost to the apex of the posterior root of the tooth to which the bridge is attached.

Examination of the cranium shows on the right side an erosion of a portion of the inner table of the skull over an area about two inches in length and beginning at about the coronal suture.

There appears to be also a calcareous deposit in an area about two inches in diameter, which I have marked with small arrows. I believe this could be a brain tumor or a gumma. It is lying just anterior to the leg center, but it seems to me that he should have some irritation or some very slight disturbance of his motor function, especially in the left leg, but perhaps in both.

There is certainly thinning of the inner table of the skull and some compression of the diploe. This compression of the diploe would lead me to think that this has been a very slow process, as his history would indicate.

There is also some thinning in the region of the cuneus. If this is due to any pathology it should give rise to distinct ocular disturbances. In the absence of any ocular disturbance, I believe this latter lesion should be ignored.

I see nothing abnormal in the cerebellum nor in the region of the petrous portion of the temporal bone.

The mastoid cells are clear on both sides.

The frontal sinuses are large and clear.

The sphenoids are clear.

The ethmoids show some exudate, but I believe no more than occurs in the average person in this weather.

The maxillary sinuses are clear.

Examination of the cervical vertebra shows some com-

pression of the fifth and sixth cervical. The bodies of these two vertebra are only about two-thirds their normal thickness. However, the edges are so sharply defined that I question whether there is any active lesion present now.

Elsewhere in the vertebra I see nothing abnormal.

As a whole, therefore, I find strongly suggestive evidence of a neoplasm anterior to the upper motor area on the right side of the head; old disease of the fifth and sixth cervical vertebra, a number of abscesses about the teeth. The lesions in the vertebra and in the head would suggest to me the necessity for a Wassermann test. I will appreciate it very much if you will let me know the final diagnosis in this case, etc."

The patient was referred to Dr. T. D. Casto (dentist), who wrote me on March 23, 1917, that he "recommended the extraction of the left lower second bicuspid and the removal of the upper left bridge attached to the second bicuspid and the second molar. On the lower right it is best to leave the second molar remain, recommending another picture in forty days, etc."

The patient preferred, however, to go to his regular dentist, Dr. M. T. Barrett, who I have learned since removed the left lower second molar and left lower bicuspid. In the meantime he treated the patient for pyorrhea with apparently good results.

The patient remained with me under treatment for his vertigo and impaired hearing in the right ear. His improvement was progressive until June, 1917, when he felt so much improved that he decided to go off on a vacation for two months in the Adirondacks. I did not see him again until October 26, 1917, when he reported that during the latter part of the summer he developed a severe attack of appendicitis with gangrene and peritonitis, when he was hurried to New York City and operated by Dr. Harold D. Meeker, who removed the appendix and besides a large gallstone. The patient reports that since he feels much better and has practically no vertigo excepting momentarily upon arising in the morning. He claimed also to be hearing better. However, careful hearing tests show the same character of findings, so far as the fork tests are concerned, but less pronounced evidence of deafness in the right ear than when first seen.

From the side of the vestibular apparatus there was no evidence of nystagmus when looking straight ahead. The galvanic reaction showed the eighth nerve on the right side to be slightly under function, in that the reaction to the cathode on that side was with six milliamperes current strength, anodal reaction four and one-half milliamperes. On the left side the nerve reacted to the cathode with a current strength of five milliamperes, and to the anode with six milliamperes.

Tests for equilibrium disturbances revealed none.

Since the removal of his appendix the patient has felt decidedly improved from every angle.

In reply to a letter sent to Dr. Meeker, the general surgeon who operated Mr. G., I received the following, under date of February 23, 1918:

"My Dear Dr. Mackenzie—This tardy reply to your letter is due to the fact that I have been in foreign military service. I operated upon Mr. G. on August 10, 1917, for an acute gangrenous appendicitis. The pathologic conditions in the neighborhood of the appendix were as follows:

The terminal ileum was fixed in sharp angulation to the posterior abdominal wall below the brim of the true pelvis. The appendix was gangrenous at its distal half, the proximal portion being firmly adherent beneath a large cecal pouch fixed in a position of internal rotation by firm fibrous bands. These conditions, other than the acute process in the appendix, judging from the density and firmness of the fixation bands, had existed for several years, and were of such a nature as to be prime factors in the production of intestinal toxemia, both from the mechanical back pressure and from the dilated, thin walled cecal cesspool. The appendix was removed, constricting bands divided, raw surfaces covered by peritoneal flaps, the dilated cecum and ascending colon plicated by the union of the external and anterior longitudinal bands.

I have had three cases during the past year with eighth nerve symptoms, operated for marked intestinal stasis with an apparent cure of the auditory symptoms.

I should be greatly interested to know what effect Mr. G.'s operation has had upon his eighth nerve symptoms.

Very sincerely yours,

(Signed) H. D. MEEKER."

In commenting on the case, there can be no doubt as to the diagnosis of neuritis of the eighth nerve and that both branches were involved, for the following reasons:

1. That so far as the hearing function is concerned, the fork findings were characteristic in every particular for a disease of the perceiving apparatus (cochlea, *nervus cochlearis*, or both combined).

2. That the presence of vertigo with nystagmus to the left (unaffected side) speaks for a destructive or relatively destructive lesion of the static labyrinth, *nervus vestibularis*, or both combined.

3. That the cochlear and vestibular nerves were involved rather than the labyrinth is indicated by the relatively negative findings in the middle ear. The labyrinth, as is well known, is involved in an inflammatory process as a result of extension of inflammatory processes from the middle ear, or the extension of inflammation from the meninges via the nerves; so that in the absence of pronounced middle ear involvement there is reason to believe that the labyrinth itself escaped inflammation from that side, and since the inflammation of the eighth nerve was at no time sufficiently intensive as to cause complete loss of function, it is highly improbable that the inflammation could have extended to the labyrinth by this route.

Concerning the etiology, syphilis was the least to be suspected cause, for syphilis though commonly a cause for bilateral eighth nerve neuritis, is a very exceptional cause for the unilateral form. It rarely happens that a more or less circumscribed gumma may affect the eighth nerve of one side. When it does, there are usually plenty of other symptoms present which were lacking in this case.

That there was improvement under the administration of potassium iodid, is no proof that the neuritis was of syphilitic origin; for the so-called rheumatic conditions and neuritis are generally known to improve under its administration.

In ascertaining the causes of neuritis, single or multiple, unilateral or bilateral, many factors must be considered, for we find neuritis following almost all the acute infectious fevers, the so-called postinfectious type. We find neuritis occurring in the course of the chronic infections, more espe-

cially those tending toward the production of granulomatous infiltrations (syphilis, tuberculosis and leukemia). We find neuritis caused by many poisons taken into the system (toxic neuritis), alcohol, tobacco, lead, arsenic, mercury, carbon-monoxide, illuminating gas, quinin, salicylates and numerous other poisons. Finally it may occur from the absorption of toxins into the general circulation, the source of which may be a chronic focus of pus infection in some more or less distant part of the body. This form is what some of the earlier authors referred to as the rheumatic type, while others referred to is as the refrigeratory type, since in many of the cases the neuritis developed after an exposure to cold and dampness. It is into this latter class that we shall eventually find placement for most of the unilateral cases of eighth nerve neuritis, including the one under discussion. In the case herewith reported I have placed it in the class of focal infection after having ruled out by the negative history and findings all the other class of causes.

Among the many foci of infection that could have been considered as a possible cause of the neuritis in this case, the nasal accessory sinuses were ruled out because of the negative findings, both from the rhinoscopic and roentgenologic aspect. The tonsils were ruled out because of their small size and open and clean crypts, the absence of a history of tonsillitis and congestion of the anterior pillars. The teeth may be ruled out since the greatest improvement in the case was obtained prior to any attention that was given to them. Therefore, in the absence of any other known focus of pus together with the positive findings of pus in the appendix, which after its removal, was followed by so pronounced an improvement in all symptoms would seem to fix the etiologic factor there rather than elsewhere.

A few words as to the part played in the case by the various gentlemen whose names appear in this report. Dr. Fellows, the family physician, realized early that the case was one of more than ordinary importance and wisely referred it to Dr. Bayley (neurologist). Dr. Bayley, who had merely the patient's history to guide him, and at a time when the symptoms were more those of the digestive disturbances than anything else and in the absence of neurologic findings, naturally referred

the case to Dr. Bradley (stomach specialist). Dr. Bradley made a most careful analysis of the stomach contents after a test meal and studied the behavior of the stomach during digestion with the co-operation of Dr. Barker (roentgenologist). Their findings were negative for the reason that the patient's trouble was farther below. Dr. Bayley, in spite of the negative reports from Drs. Bradley and Barker, still contended that there was something wrong with the digestive tract, and in this respect future events proved Dr. Bayley to be correct. That someone had not discovered the latent appendicitis is not to be wondered at, for the best that one can do in this type of case is merely to suspect the condition and await further developments, for no one would care to suggest operation in any case upon suspicions alone in the absence of definite findings.

That the London specialist succeeded in obtaining some transient relief for the patient's ear condition by Politzer inflation was due to the fact that the patient had a mild obstruction of the eustachian tube, which accounted in a measure for the sensation of fullness and of a bubble of water in the right ear. These sensations were probably due to a negative pressure in the middle ear and were naturally improved by the substitution of a positive pressure. That Dr. Goddard should have performed a submucous resection was justifiable in the presence of a deviated septum to the side corresponding to the obstructed eustachian tube.

Concerning the roentgenologic reports of Drs. Barker and Pfahler, there can be no criticism, for both did their parts well, so far as could be expected. The pictures made by these gentlemen are perfect and their interpretations well founded. Dr. Barker found an anomalous eminentia arcuate on the right side that was not present on the left (unaffected side), and it was a fairly good presumption on his part to suspect the condition as one of gummatous infiltration of the temporal bone.

That Dr. Pfahler because of the absorption of diploe and the thinning of the inner table of the skull on the right side anterior to the motor area should suspect a neoplasm, was perfectly justifiable, and in the presence of the thinning of the bodies of the fifth and sixth cervical vertebra to suspect

these multiple bone lesions to be of probable luetic origin was quite natural. However, in the presence of the after-developments the diagnosis of tumor must be excluded, besides the absence of intensive headaches and choked disc would certainly exclude such a **diagnosis**.

Dr. Casto (dentist), after studying Dr. Pfahler's report and some films of his own making, suggested the removal of the second lower bicuspid tooth and the conservative treatment of other questionable teeth until such time as they were no longer questionable. In doing so he was following the dictates of his own experience as well as the experience of our best dental surgeons.

Dr. Barrett (dentist), to whom the patient went, put into effect, and upon his own initiative, the suggestions offered by Dr. Casto, and with excellent results, so that at this time the patient's remaining teeth are in excellent condition. Had it not been for the acute exacerbation of the chronic appendicitis and its successful operation by Dr. Meeker (surgeon), there would have been lost to us the most important and instructive feature of the case, namely, the diagnosis of an obscure appendicitis cured by operation which in turn cured the patient of all his other troublesome symptoms, the most bothersome of which was the neuritis of the eighth nerve.

A neuritis of the eighth nerve of one side that destroys the hearing and equilibrium rapidly and completely is far less discomfoting than a less intensive neuritis, such as this patient had, which was fluctuating between destruction and restitution.

The case just cited in most particulars is quite like others I have seen. The majority of them have been of focal infectious origin, and they comprise a class, as previously stated, that are most intricate and interesting to study. The etiology can be determined only after a most exhaustive search according to a definite plan and systematic method of exclusion.

GASPARO TAGLIACCOZZI AND HIS CONTRIBUTION
TO RHINOPLASTY.BY MORTIMER FRANK, B. S., M. D., AND IRA FRANK, M. D.,
CHICAGO.

The early part of the sixteenth century must always rank among the most remarkable periods in the history of civilization. The invention of printing had made literature the property of many to whom it had hitherto been inaccessible. The downfall of the Byzantine Empire scattered over Europe numbers of fugitive Greeks, who carried with them to the Western world many treasures of classical literature. Raphael, Michelangelo and others revived the glory of the ancients in the realm of art. The narrow limits of the old world had vanished, and the Spanish and Portuguese navigators opened up the way to vast new domains, while the Reformation revolutionized the spirit of mankind and put an end to the age of ignorance and superstition.

During this active period the greatest discoveries in the study of anatomy took place. Every part of the human frame was carefully studied and important discoveries made. Andreas Vesalius, the reformer of anatomy, who had the courage to set aside the teachings of Galen and undertake a new arrangement for anatomic instruction; Eustachi, his contemporary, for his observations of the internal ear and the tube which bears his name; Falloppio, who rectified the knowledge then possessed of the anatomy of the ear; and William Fabry of Hilden, a pupil of Falloppio, who merits distinction for his efforts in the comparative anatomy of the ear and larynx and for the employment of the tube in tracheotomy.

It was in this century that Gasparo Tagliacozzi (Tagliacotius, Taliacotius*), professor of anatomy and surgery in the

*In "The Gentleman's Magazine," London, 1794, LXIV, 1093, a correspondent whimsically insinuates whether the Latin name Taliacautius is not taken from the Italian tagliare and cauto, or cautamente—i. e., to cut out with caution or judgment, and so applied as a nickname to this celebrated surgeon.

University of Bologna, revived and improved the operation for the formation of a new nose by the use of the skin over the biceps muscle of the individual, now known as the Talia-cotian operation. Tagliacozzi was born at Bologna in the year 1546 and died there November 7, 1599, when fifty-three years old. Very few particulars have been recorded of the life of this distinguished surgeon. Three other Italian surgeons, Vincentio, Vianco, Bogani, and the itinerant operators, the Brancas of Catania, achieved distinction before him as the first who attempted and successfully performed the operation of rhinoplasty. They cut a piece of flesh from the arm, leaving only a few fibers attached to the extremity, and adapting it to the shape of the nose, keeping the raw surfaces in contact by binding the limb across the face, and finally when the adhesion became completed, cut the part entirely away from the arm.

Falloppio, Vesalius, Paré, and Fabry thought it their duty to apologize for this novel operation of grafting, as Tagliacozzi called it, but such was his enthusiasm in favor of the operation that he maintained that the new nose possessed the sense of smell more acutely than the natural one, and not without some success, for he aroused the enthusiasm of his fellow citizens to such a pitch that they erected in the high school of Bologna several laudatory tablets, and after his death placed in the anatomic theater of the university a bust in his honor that represented him holding a nose in his hand. These have since disappeared. The theologians of his own time bitterly attacked him and accused him of impiously interfering with the function of the Creator, attributing the success of his operation to the devil. Their hostilities pursued him even to the grave. He was interned in the Church of San Giovanni Battista, and the report was circulated that a few weeks after his burial a mysterious voice was heard crying out "Tagliacozzi is damned." Thereupon the Bolognese clergy ordered the remains exhumed and buried in unconsecrated ground. During the following century Butler in his "Hudibras"* satirized Tagliacozzi, and the stanza was used as the

*Canto I, Part I, line 281 to 286.

text for a humorous account of him by Addison and Steele in the "Tatler."

"No. 260. THURSDAY, DECEMBER 7, 1710.

Non cuicunque datum est habere nasum. Mart. i. 42.

The nose, 'tis said, shows both our scorn and pride,
And yet that feature is to some deny'd.—R. Wynne.

From my own apartment, December 6.

We have a very learned and elaborate dissertation upon thumbs in Montaigne's Essays, and another upon ears in the "Tale of a Tub." I am here going to write one upon noses, having chosen for my text the following verses out of "Hudibras":

'So learned Taliacotius, from
The brawny part of porter's bum
Cut supplemental noses, which
Would last as long as parent breech;
But when the date of Nock was out
Off dropt the sympathetic snout.'

Notwithstanding that there is nothing obscene in natural knowledge, and that I intend to give as little offense as may be to readers of a well bred imagination, I must, for my own quiet, desire the critics, who in all times have been famous for good noses, to refrain from the lecture of this curious Tract. These gentlemen were formerly marked out and distinguished by the little rhinocercical nose, which was always looked upon as an instrument of derision; and which they were used to cock, toss, or draw up in a contemptuous manner, upon reading the works of their ingenious contemporaries. It is not, therefore, for this generation of men that I write the present transaction,

. . . Minus aptus acutis

Naribus horum hominum.—Hor. Sat. i. 3. 29.

. . . Unfit

For the brisk petulance of modern wit.—Francis.

but for the sake of some of my philosophical friends in the Royal Society, who peruse discourses of this nature with a becoming gravity, and a desire of improving by them.

Many are the opinions of learned men concerning the rise

of that fatal distemper, which has always taken a particular pleasure in venting its spite upon the nose. I have seen a little burlesque poem in Italian that gives a very pleasant account of this matter. The fable of it runs thus: Mars, the god of war, having served during the siege of Naples in the shape of a French colonel, received a visit one night from Venus, the goddess of love, who had been always his professed mistress and admirer. The poem says she came to him in the disguise of a suttling wench, with a bottle of brandy under her arm. Let that be as it will, he managed matters so well that she went away big-bellied, and was at length brought to bed of a little Cupid. This boy, whether it were by reason of any bad food that his father had eaten during the siege, or of any particular malignity in the stars that reigned at his nativity, came into the world with a very sickly look and crazy constitution. As soon as he was able to handle his bow he made discoveries of a most perverse disposition. He dipped all his arrows in poison that rotted everything they touched; and, what was more particular, aimed all his shafts at the nose, quite contrary to the practice of his elder brothers, who had made a human heart their butt in all countries and ages. To break him of his roguish trick, his parents put him to school to Mercury, who did all he could to hinder him from demolishing the noses of mankind; but, in spite of education, the boy continued very unlucky; and though his malice was a little softened by good instructions, he would very frequently let fly an envenomed arrow and wound his votaries oftener in the nose than in the heart. Thus far the fable.

I need not tell my learned reader that Correggio has drawn a Cupid taking his lesson from Mercury, conformable to his poem, nor that the poem itself was designed as a burlesque upon Fracastorius.

It was a little after this fatal siege of Naples that Talia-cotius began to practice in a town of Germany. He was the first love-doctor that I meet with in history, and a greater man in his age than our celebrated Dr. Wall. He saw his species extremely mutilated and disfigured by this new distemper that was crept into it and, therefore, in pursuance of a very seasonable invention, set up a manufacture of noses, having first got a patent that none should presume to make

noses besides himself. His first patient was a great man of Portugal, who had done good services to his country, but in the midst of them unfortunately lost his nose. Taliacotius grafted a new one on the remaining part of the gristle or cartilaginous substance, which would sneeze, smell, take snuff, pronounce the letters M or N, and, in short, do all the functions of a genuine and natural nose. There was, however, one misfortune in this experiment; the Portuguese's complexion was a little upon the subfusc, with very black eyes and dark eyebrows; and the nose being taken from a porter that had a white German skin, and cut out of those parts that are not exposed to the sun, it was very visible that the features of his face were not fellows. In a word, the Conde resembled one of those maimed antique statutes that has often a modern nose of fresh marble glued to a face of such a yellow, ivory complexion as nothing can give but age. To remedy this particular for the future, the doctor got together a great collection of porters—men of all complexions, black, brown, fair, dark, sallow, pale, and ruddy, so that it was impossible for a patient of the most out-of-the-way color not to find a nose to match it.

The doctor's house was now very much enlarged, and became a kind of college, or rather hospital, for the fashionable cripples of both sexes, that resorted to him from all parts of Europe. Over his door was fastened a large golden snout, not unlike that which is placed over the great gates at Brazen-nose college in Oxford; and, as it is usual for the learned in sentence, the doctor writ underneath this great golden pro-foreign universities to distinguish their houses by a Latin boscis two verses out of Ovid:

"*Militat omnis amans, et habet sua castra Cupido;
Attice, crede mihi, militat omnis amans.*"

—Ovid. *Amor. El. ix. i.*

The toils of love require a soldier's art;
And every lover plays the soldier's part.

It is reported that Taliacotius had at one time in his house twelve German counts, nineteen French marquises, and a hundred Spanish cavaliers, besides one solitary English esquire,

of whom more hereafter. Though the doctor had the monopoly of noses in his own hands, he is said not to have been unreasonable. Indeed, if a man had occasion for a high Roman nose, he must go to the price of it. A carbuncle nose likewise bore an excessive rate; but for your ordinary short turned up noses, of which there was the greatest consumption, they cost little or nothing; at least, the purchasers thought so, who would have been content to have paid much dearer for them rather than to have gone without them.

The sympathy betwixt the nose and its parent was very extraordinary. "Hudibras" has told us that when the porter died the nose dropped, of course, in which case it was always usual to return the nose, in order to have it interred with its first owner. The nose was likewise affected by the pain as well as death of the original proprietor. An eminent instance of this nature happened to three Spaniards, whose noses were all made out of the same piece of brawn. They found them one day shoot and swell extremely; upon which they sent to know how the porter did, and heard, upon inquiry, that the parent of the noses had been severely kicked the day before and that the porter kept his bed on account of the bruises it had received. This was highly resented by the Spaniards, who found out that the person that had used the porter so unmercifully, and treated him in the same manner, as if the indignity had been done to their own noses. In this and several other cases it might be said that the porters led the gentlemen by the nose.

On the other hand, if anything went amiss with the nose, the porter felt the effects of it, insomuch that it was generally articulated with the patient that he should not only abstain from all his old courses but should, on no pretense whatever, smell pepper or eat mustard on which occasion the part where the incision had been made was seized with unspeakable twinges and prickings.

The Englishman I before mentioned was so very irregular and relapsed so frequently into the distemper which at first brought him to the learned Taliacotius, that in the space of two years he wore out five noses, and by that means so tormented the porters that if he would have given five hundred pounds for a nose there was not one of them that would

accommodate him. This young gentleman was born of honest parents, and passed his first years in fox hunting; but accidentally quitting the woods and coming up to London, he was so charmed with the beauties of the playhouse that he had not been in town two days before he got the misfortune which carried off the part of his face. He used to be called in Germany "the Englishman of five noses" and "the gentleman that had thrice as many noses as he had ears." Such was the raillery of those times.

I shall close this paper with an admonition to the young men of this town, which I think the more necessary because I see several new fresh colored faces, that have made their first appearance in it this winter. I must therefore assure them that the art of making noses is entirely lost, and, in the next place, beg them not to follow the examples of our ordinary town rakes, who live as if there was a Taliacotius to be met with at the corner of every street. Whatever young men may think, the nose is a very becoming part of the face, and a man makes but a very silly figure without it. But it is the nature of youth not to know the value of anything till they have lost it. The general precept, therefore, I shall leave with them is to regard every townwoman as a particular kind of siren that has a design upon their noses, and that, amidst her flatteries and allurements, they will fancy she speaks to them in that humorous phrase of old Plautus, *Ego tibi faciem denasabo mordicus*. "Keep your face out of my way or I will bite off your nose."

In this way the Tagliacotian method fell into disrepute and was forgotten for nearly two centuries until revived by Diefenbach.

The first medical author extant to mention this operation since the revival of letters is Alexander Benedictus, a Veronese professor at Padua, in 1495. He took his flap from the patient's arm, and adds that these artificial noses badly endure the winters. All the medical and surgical writers from Celsus to this date are silent upon this subject. About the middle of the first century Celsus treats on the mode of repairing fractures of the nose in the fifth chapter of his eighth book

*Geschichte der Chirurgie, 1898.

("De Medicina"), but says nothing about autoplasmic operations.

Von Gurlt,* in his account of Tagliacozzi, says that he accepted for himself a credit which in reality belonged to certain Sicilian and Calabrian surgeons. About the middle of the fifteenth century there lived in the city of Catania, on the coast of Sicily, a surgeon by the name of Branca, who devoted himself almost entirely to the reconstruction of injured and defective noses. Branca used the ancient Hindu method of transplanting the skin of the forehead or cheek for his flap, but later this was improved upon by his son, who utilized a flap of skin from the arm, thus avoiding any further disfigurement of the face. In 1442 the Neapolitan poet, Calentino, wrote to his friend Orphian, who had lost his nose: "If you want a new nose pay me a visit. Branca, a Sicilian surgeon, has found a way to restore lost noses. He either takes flesh from the patient's arm or engrafts on him a slave's nose. The thing is truly marvelous! As soon as I saw it I made haste to send you the news, for to whom could it be more important? Rely upon it, if you come hither you can go away with as many noses as you like."

Pupils of the younger Branca demonstrated the method to the Bojano family in Tropea, Calabria. Both families were itinerant surgeons and practiced the method as a family secret. From them it was transmitted about the middle of the sixteenth century to Tagliacozzi, to whom belongs the credit of first fully describing the operation.

Wojciech Oczka, a Polish surgeon, published a book on syphilis and surgery in 1581, and in it says that Aranzio (or Arantius), who was professor of surgery at Bologna at the time (1569) when he was at the school, was successful in making a new nose by transplanting a skin flap from the arm. As this was done at Bologna several years before Tagliacozzi's time and before the date (1586) of Tagliacozzi's earliest comment, Von Gurlt says it furnishes ample proof that the credit for introducing rhinoplasty to European surgeons belongs to Aranzio rather than to Tagliacozzi.

Fabry of Hilden in his *Observationum et curationum medico-chirurgicarum centuriae*, Frankfurt, 1646, 214, relates that his teacher, Jean Griffon, of Lausanne, performed the same

operation in 1590. "Year 1590. When the Duke of Savoy made war upon Geneva, a virgin fell into the hands of the soldiers. When they tempted her in vain, being enraged, they cut her nose off. About two years after she went to Lausanne, where Jean Griffon, a most ingenious and successful surgeon, then lived. He undertook to cure her and restored her nose so artificially that, to the admiration of all, it appeared rather natural than artificial. I myself have seen her several times, and is still unmarried at Lausanne this present year 1613. It is true that in the cold of winter the tip of the nose looks livid, but is nourished as the other parts of the body and endued with sense. Griffon had some hints of the method from an Italian, as he traveled through Lausanne, who had spoken with the famous Tagliacozzi, though he had never seen the operation performed nor Tagliacozzi's book before he had operated on the maiden. But he cured the maiden in the same manner as described by Tagliacozzi."

The first edition of Tagliacozzi's *De curtorum chirurgia per insitionem, libri duo*, contains twenty-two full page wood engravings or "Icons," and was published in folio at Venice in 1597, two years before his death. It was dedicated to the Grand Duke of Tuscany, to whom Tagliacozzi was the chief surgeon. The second edition, a small octavo, appeared in the following year at Frankfort in 1598. The third and last edition, also in octavo, with six lithographic plates, was edited by Troschel at Berlin in 1831.

The twenty-two "Icons" exhibit, in successive stages, the patient minus his nose and the place on the left arm from whence the flap is to be taken. As the series proceeds to the end, the instruments used are shown, the cucullus, or retentive apparatus, the steps and stages of the operations for restoring the nose, ears and lips. Some of the figures are on a full folio page, others have from two to four figures each. The work is divided into two books. In the first part of the first book numerous references from the Scriptures, Homer, Horace, Plutarch, and others are taken, bearing upon the subject of autoplasmic surgery. The second book is devoted to the autoplasmic surgery of the nose, ears and lips.

The description of the method of rhinoplasty, as given in the second book, is as follows: "The arm which is to serve

for the flap is entirely bared, either by rolling up the sleeve of the undergarment or by ripping it apart, so that the field is easily accessible for operation and for treatment. The assistants are placed at equal distances, the circumstances governing their stations. The senior should sit at the patient's head at the upper part of the couch, on the right hand side of the operator. He holds firmly the elbow of the patient with his right hand, for the more firmly it rests the better the operation progresses. The left hand is employed where necessary so that it may opportunely aid, or if unemployed may be always ready to serve when the occasion demands. The office of the other is to lift up the skin, and having secured a fold to pass the forceps to aid the surgeon, and presently to hold the forceps while the operator performs the section, and when this has been perfected, to remove the flap. And he who undertook a seat at the left side of the operator or opposite him shall see that the arm does not fall. So each of the assistants shall be so placed that his services will be available in the shortest time and in the most efficient manner. The nod of the operator and not the voice shall be the means of communication which everyone shall observe and be able to interpret instantaneously. By this means the patient is spared. Meanwhile, the surgeon having gotten rid of his flowing and unsuitable sleeves and his arms bared to the elbows, is more able to perform his operation, comes close to the side of the patient and standing ready for any exigency is prepared to go to work. But first the skin on the ventral aspect of the arm from which he desires to take the flap is gently examined and stretched, and he lets it go and again lifts it up, and at length lets it go, so that by this gentle manipulation it will be released from the underlying tissue. The ease with which it can be removed will be in proportion to his success in loosening the tissues, and the more persistent this practice of stretching, the more soft and yielding is the tissue and the more readily can it be handled when it is dissected off. It is then grasped in a fold as it is by the forceps. However, let this precaution be taken, that the parts surrounding do not develop a fever from manipulating the parts and irritable humors thereby forced into the wound. The veins and the branches of the arteries are very close, and so manipulation should

prepare the skin, less any untoward circumstance should befall that part. Everything being ready, the surgeon should make it a special business to delineate, with ink, the size and shape of the flap if he is new to the operation and is performing it for the first time. But when he is experienced the skin is picked up as the necessity of the case warrants, held, given to the assistant on his left, and immediately with each hand he takes the forceps and clamps them onto the flap. In the meantime, if a part of the skin has slipped out of the forceps it must be lifted and stretched again until the fold is correct and the forceps closed firmly and held by the assistant on the left. The surgeon now takes the scalpel in his right hand and commences the incision with the point of the knife. The incision should not be made in haste, but gradually, until it is seen that the design is complete in every part of the forceps. The section having been accomplished, which is the first step in the operation, the knife is laid aside and one or the other of the assistants takes it and perforates the flap either with it or with a probe. The assistant on the left should attempt to force a piece of gauze through the opening thus formed. The skin having been removed, an attempt should be made to form new nostrils and restore the face despoiled of its proper beauty. When, at last, the skin has been dissected from the nose, the surgeon should take further charge of the operation. These preliminaries ought to be followed so that the flap shall be correct and large enough to form the tip of the nose.

The bandages should be so adjusted that the arm cannot be used; the position of the arm is as follows: The upper arm must be lifted up high enough for the forearm to be brought close to the face and to bring the wrist at the upper margin of the forehead. The hand is spread out over the head in a line with the sagittal suture, the lower forearm crossing the coronal suture and the metacarpal region at the top of the head. This is arranged in such a manner that the middle finger touches the line of the lambdoid suture at the angle. In this position there is balance to the face and arms, so that the former declines slightly downwards and looks in a slightly oblique angle at the arm. Nearest to the upper arm is the end of the nose, which forms a union with the inner side of

the arm in a transverse line behind the elbow.

Signs of union should appear by the fourth day, if the time of the operation is in the heat of the summer, when the bandages may be relaxed. But under the wintry heaven, when the bodies are fuller of humors and impurities, the sixth day would be soon enough. The end of the seventh day in the summer should bring union of the parts, but in cold weather such union may be delayed to the tenth day. As for the rest, it may take fourteen days for the adhesions to be complete, or in the winter the twentieth day. The task of forming the tip of the nose will be shortened by the use of a plaster cast or a metallic mold whose hardness will leave a continual impress upon the end of the nose."

The foregoing by Tagliacozzi is a literal translation and pieced together, as the description is scattered in isolated sentences throughout the entire book. It shows with what minuteness of detail the early surgeon approached his work.

Notwithstanding the priority claims of his predecessors, Tagliacozzi perfected rhinoplasty to a greater degree and practiced it more skillfully and extensively, and, what is still more important, wrote the first and only work on the subject which is to be found in the history of surgery for over two hundred years.

GASPARIS TALIACOTII

BONONIENSIS,

PHILOSOPHI ET MEDICI PRAECLARISSIMI;

Theoricam ordinariam, & Anatomien in Gymnasio Bononiensi publicè profitentis.

De Curtorum Chirurgia per insitionem;

LIBRI DVO.

In quibus ea omnia, quæ ad huius Chirurgiæ, Narium scilicet, Aurium, ac labiorum per insitionem restaurandorum cum Theorica, tum Practica pertinere videntur, clarissima methodo cumulatissimè declarantur.

Additis Cutis Traducis instrumentorum omnium, atque deligationum
Iconibus, & Tabulis.

*Cum Indice quadruplici expeditissimo, Capitem singulorum, Authorum, controuersiarum,
Rerum denique & verborum memorabilium.*

*Cum Privilegijs Summi Pontificis, Cæsareæ Maiestatis, Christianissimi Regis Galliæ, Regis
Hispaniarum, Senatus Veneti, & aliorum Principum.*



VENETIIS, M D XCVII.

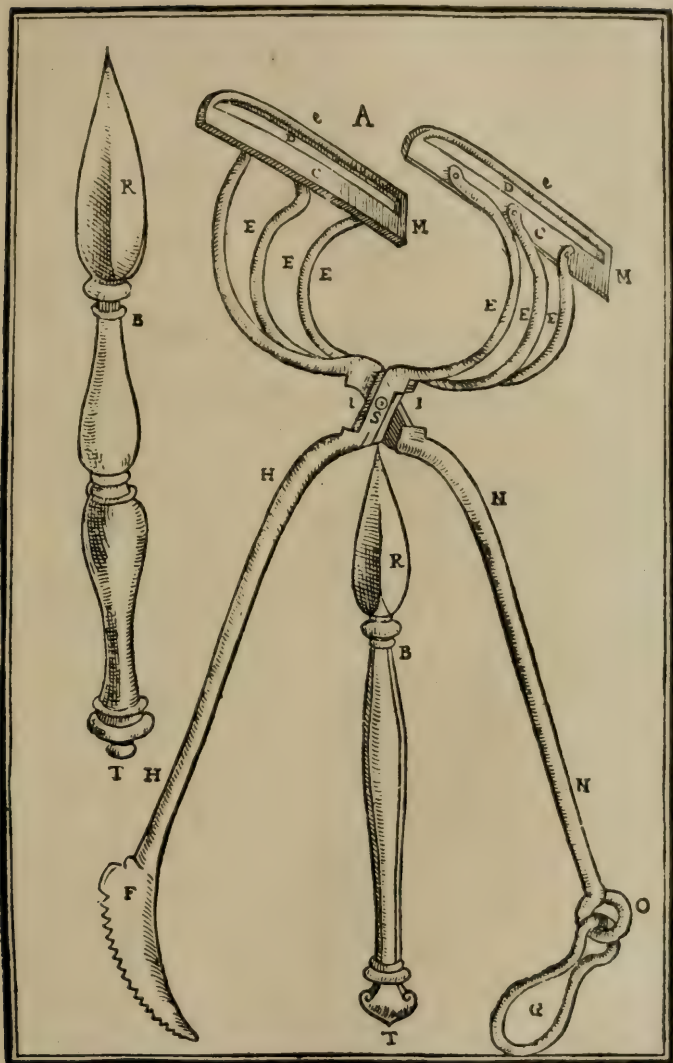
Apud Gasparem Bindonum juniorem.

ICONES.

Hæc tabula forcipem tricipitem habet pro delineatione longiori cutis propaginis, & cultros ad id operis necessarios.

- A* Forceps triceps delineationis cutis propaginis.
MM Lamina forcipis.
DD Linea ipsius laminae, per quam cultro admissa cutis inciditur.
ee Lamina infernum labrum, & brachium tangens.
CC Lamina supernum labrum, & cutim propaginem respiciens.
EEE Arcus triceps forcipis, à quo nomen sumpsit.
II Coniunctio forcipis.
S Coniunctionis clavis.
HH Manubrium ferratum.
F Manubrij ferra.
NN Manubrium anulare.
O Manubrij anulus fixus.
G Manubrij anulus mobilis.
BB Cultri delineanda cuti propagini necessarii.
RR Cultrorum acies.
TT Cultrorum manubria.

CHIRVRG. CVRT.
Icon Secunda.



I C O N E S.

Hæc tabula curtas nares, cutaneum traducem eductum, & eius aream indicat.

G *DH* Cutis propago educta.

H Propaginis apex.

G Radix eiusdem.

D Propaginis corpus.

ABFE Area cutis propaginis unde fuit abiuncta, & educta.

A'B Terminus area superior.

F Terminus inferior area.

E Corpus area.

CHIRVRG. CVRT.

Icon Quinta.



ICONES.

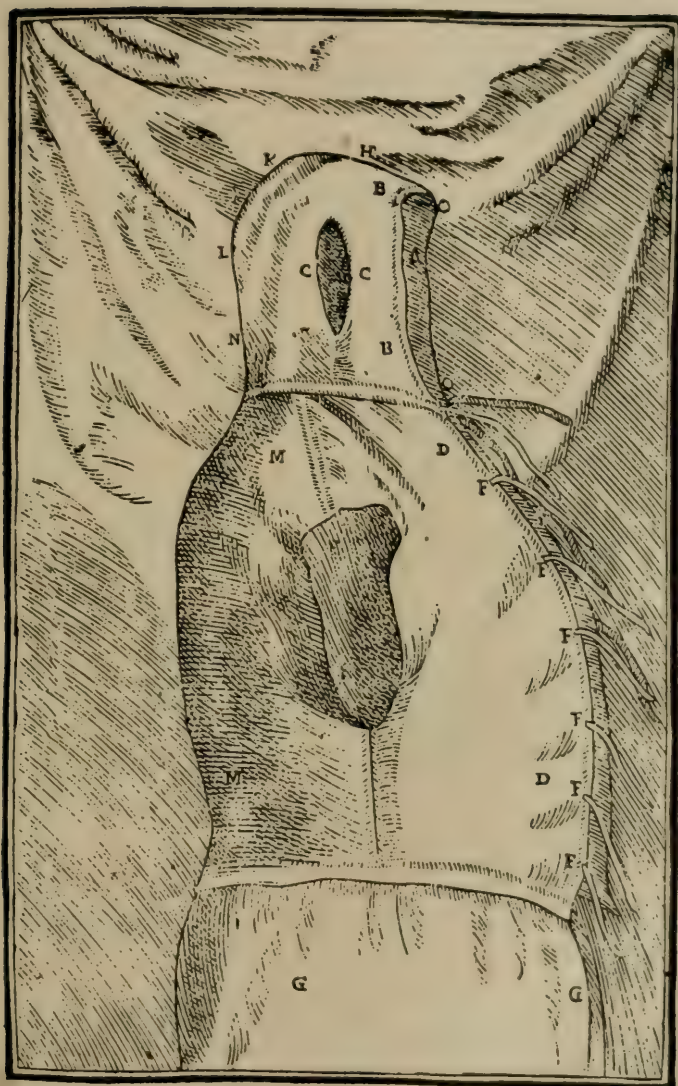
Hæc tabula vestitum vniuersum præter deligationis fascias
clarissimè demonstrat.

VLKH Cucullus.

- | | |
|-------|---|
| A | Cuculli pars anterior, qua facies erit. |
| B B | Cuculli pars dextra. |
| O O | Cuculli pars sinistra. |
| C C | Foramen, qua patet auribus exitus. |
| D D | Thoracis, vel diploidis pars anterior. |
| M M | Thoracis, vel diploidis posterior pars. |
| E E | Locus qua brachia exeunt. |
| F F F | Funiculi. |
| G G | Calige. |

CHIRVRG. CVRT.

Icon Sexta.



I C O N E S.

Hæc tabula cum anticam, tum dextram partem deligationis ostendit.

- | | |
|-------------|--|
| <i>L</i> | <i>Cutanei traducis apex, ubi adest insitio.</i> |
| <i>I</i> | <i>Cutanei traducis radix.</i> |
| <i>NY</i> | <i>Areæ vulnus medicamentis obductum, & deligatum.</i> |
| <i>α α</i> | <i>Fascia regia.</i> |
| <i>D'D</i> | <i>Fascia cubitalis.</i> |
| <i>CCC</i> | <i>Fascia pectoralis.</i> |
| <i>M</i> | <i>Fascia brachialis.</i> |
| <i>BB</i> | <i>Fascia ascellaris.</i> |
| <i>OO</i> | <i>Cucullus.</i> |
| <i>NN</i> | <i>Foramen auriculare cuculli.</i> |
| <i>GGGG</i> | <i>Thorax, siue diplois anterior.</i> |
| <i>HH</i> | <i>Thoracis disjunctio, insimul funiculis coniuncta.</i> |
| <i>AAA</i> | <i>Funiculi, quorum opera fascia cum cucullo, vel diploidi coniunguntur.</i> |

CHIRVRG. CVRT.

Icon Occlava.



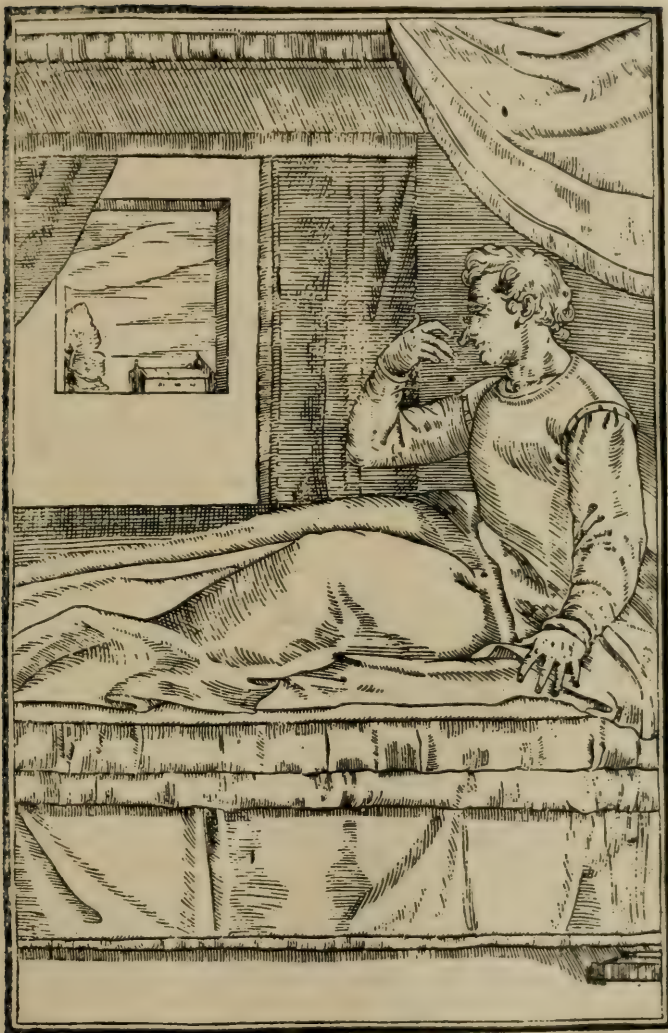
ICONES.

Hæc tabula cutaneum traducem rescissum indicat.

- A* Cutaneus tradux rudis adhuc & informis illico a ipsa rescissione.
- B* Cutanei traducis insertio.

CHIRVRG. CVRT.

Icon Decima.



XXXI.

EXAMINATION OF APPLICANTS FOR AVIATION SERVICE, U. S. ARMY—DISQUALIFYING FAC- TORS IN FIFTEEN HUNDRED CASES—SOME OBSERVATIONS OF PAST-POINTING AFTER ROTATION.*

BY CAPTAIN W. A. SCRUTON, M. R. C.,
NEW YORK.

An impression has become very general that it is almost impossible to successfully pass the tests of the physical examining units established by the aviation section of the Signal Corps throughout the country, unless one is a sort of super-man physically. This impression is absolutely erroneous. It has gained circulation through the exaggerated accounts of disqualified candidates and their friends. As a result of their malicious yarns, some men come to our examinations primed with false notions of what they are going to experience in the way of physical tests. They proceed to make friends with the Sergeant, and then guardedly and with apparent unconcern ask when they might expect the mallet test, or the pistol and needle test. The Sergeant, a nice, kind fellow, explains the whole process in detail, adding that special orders from Washington have recently added a few new tests for try out. If I suddenly approach an applicant after he has had such confidential inside information, he will break into a cold sweat and immediately have urgent business down the corridor.

Perhaps it is only proper that I should explain these mythical tests in detail. In the mallet test, the candidate is supposed to be led into a room alone with two examiners. He is seated at ease, while an examiner holding a stop watch, engages him in conversation. The second examiner is behind the chair, and cannot be observed. At the proper moment—that is, when the candidate is thoroughly calmed by conver-

*Read before the Section of Otology, New York Academy of Medicine, February 8, 1918.

sation—he is tapped on the head with a mallet, *secundum artum* at a nonvital spot. If he recovers consciousness in twenty seconds, he is normal. In the pistol and needle test the candidate is again seated at ease. He holds a needle between his thumb and forefinger, the point being against the forefinger and the head against the thumb. While he is engaged in conversation concerning his knowledge of pastoral pursuits, a pistol is suddenly discharged. If the needle pricks his finger and draws blood, he is disqualified as nervously unfit.

The physical requirements of the aviation section of the army are really in no way unduly severe or rigid. We are enjoined to obtain men with perfect aural mechanism, perfect vision, including normal ophthalmoscopic findings, excellent hearts and lungs, sound teeth, and no form of hernia. All other minor defects may be overlooked or waived. Certainly this standard is not too high, and no qualified person would think of suggesting that it be relaxed. Frequently rejected men tell me that the Canadian Royal Flying Corps will accept them. I know this to be true, as Captain MacDonald, C. R. F. C., has told me that he accepts men with 20/30 vision. It may be that we will eventually find it necessary to reduce our standard of physical requirement to conform with that of the aviation sections of other armies, but at present there does not seem to be a remote possibility of this occurring.

It would save considerable annoyance, and avoid mutual ruffling of tempers if physicians having patients who have been rejected by the New York unit would bear in mind that I do not personally set the standard. If a man has a spot of choroiditis, no matter what his vision is, he does not fly for the United States; the same also applies to slight defects in hearing. These matters generally seem to be of little consequence from the standpoint of successful flying, when one's personal patient is rejected. Remember, that if the condition is admitted as being present, the prescribed causes of disqualification cover the case absolutely. If the condition is not admitted as being present, I will always be glad to refer the doctor to the proper authorities for arranging a reexamination, when the opinions of the consultants of the unit would be available. There is no Board of Appeal. All cases are re-

ferred back to the original examining unit for reexamination.

Soon after taking charge of the New York unit last November, I realized that the profession was greatly interested to know how many men we were examining, the total number disqualified, and the number disqualified under subheadings in the the three different departments—eye, ear, nose and throat—and physical. As no data was at hand, it was necessary to arrange some method by which such tabulation could be carried and checked up daily so as to be available for immediate reference. After considerable experimenting, a card system was worked out along lines suggested by Sergeant Dana, who got the idea from some reports he had been required to keep at Camp Upton. The system was put into operation December 6th, and has proved quite satisfactory, save that we now see that some of the subheadings could have been again divided to furnish more detailed information. Copies of the card of February 7th will be passed to each of you. This card is a record of flyers only; a separate card is kept for nonflyers, whose examination is the same as that given to any line officer, and will not be considered here.

The entire number of men examined from December 6th to date, flyers and nonflyers included, is 1,752. Eleven hundred and thirty-two of these were passed, and 620 were rejected. Considering the flyers alone, 1,364 were examined in this period: of these, 850 were accepted and 514 rejected. This makes 38 per cent rejections among the flyers.

Grand		Carried	February 7, 1918	
Total		Over	Current	
1364	850	837	13	Accepted.
	514	505	9	Rejected
	84	83	1	Stereoscope
	6	6	....	Spontaneous Nystagmus
	16	16	....	Ocular Movements
	8	8	....	Visible Lesion
	63	63	....	Color Vision
	8	8	....	Hypophoria
	11	11	....	Exophoria
	12	12	....	Esophoria
	170	165	5	Visual Acuity
	34	34	....	Near Point
	21	21	....	Vitrious Opacities
	30	30	....	Opacities Lens

Grand Total	Carried Over	Current	
25	25	....	Choriditis
.....	.....	....	Retinitis
1	1	....	Nerve Head
489	483	6	Total Rejections, Eyes
12	12	....	Ear Drum
86	86	....	Hearing
2	2	....	External Canal
11	11	....	Ozena
8	8	....	Ethmoiditis
8	8	....	Static and Dynamic
8	8	....	Nystagmus Prolonged
8	8	....	Nystagmus Shortened
4	4	....	Marker Unequal Nys.
1	1	....	Falling
148	148	....	Total Ear, Nose, Throat, Rotation
133	130	3	Weight
12	12	....	Height
45	43	2	Chest Measurement
3	3	....	Respiratory System
23	22	1	Bones and Joints
17	17	....	Blood Pressure
55	55	....	Heart
19	19	....	Hernia
2	2	....	Hemorrhoids
10	9	1	G. U. System
3	3	....	Urinalysis
322	315	7	Total Physical

Additional rejections not recorded on the card:

Psoriasis, two cases.

Paresis of vocal cord, one case.

Pyorrhea, one case.

Unsound or absent teeth, four cases.

Thyroid enlargement, two cases.

Explanation of the Record Card.—It is marked in three columns, the first designated "Current," which gives the result of the day; the second, "Carried Over," gives the total result from the date when the system was established; the third, "Grand Total," which gives the total result of all examinations to date.

The rotation tests in the examination for aviation service have come into considerable prominence, due largely to the number of published magazine and newspaper articles, some

of them illustrated and all written as news items for public consumption. This test is the one most feared by the candidates; not understanding it, they feel that it is something developed with a special view to disqualifying a large number. As a matter of record in the New York unit, only twenty-one men out of 1,364 have been disqualified for failing to respond correctly to the rotation tests. The test is extremely important, as a normal balance mechanism is absolutely essential in aviation service.

Quoting from one of Major Jones papers, "The rotation test constitutes an objective measurement of the degree of function of the eighth nerve; we are not dependent on mere subjective impressions of the patient. Furthermore, if the Bárány tests show normal responses, they indicate not only normal labyrinth, but normal eighth nerves and normal vestibular pathways throughout the medulla oblongata, pons, six cerebellar peduncles, the cerebellum, and the pathways through both the cerebral crura to the cerebral cortex."

If these tests are carried through according to the prescribed directions, candidates rarely experience any unpleasant effects. Physicians when first taking up this work always furnish different returns in their results than they do when more experienced. Some examiners constantly have cases that cross-point or diverge in pointing. The result of their observation of the after-nystagmus following rotation is rarely equal in both directions of the rotation, because of inattention to prescribed detail.

I have never had a case of persistent cross-pointing or divergent pointing turned over to me for reexamination that did not point properly when care was exercised to maintain a correct position in the chair and rotate exactly ten times in ten seconds, stopping the rotation with considerable jolt. I would estimate that I have reexamined thirty or forty such cases. It has never been necessary to resort to the caloric test to clear up the unusual results occasionally returned by the examiners. I would say that nine out of ten cases should show an equal duration of after-nystagmus following rotation in either direction. The past-pointing will then take place an equal number of times with both arms to the right and to the left. If the after-nystagmus has been prolonged, the past-pointing will continue

longer, and vice versa, which would respectively give higher or lower number of past-points.

The cause of cross-pointing and divergent pointing is absolutely an improper position of the head during rotation. At the present time there is not an entirely satisfactory chair manufactured for this type of work. I have knowledge, however, that promising experiments are in progress.

210 E. 64th St.

INFECTIONS OF THE PARANASAL SINUSES IN
INFANTS AND YOUNG CHILDREN, WITH
SPECIAL REFERENCE TO ADENOIDS AND
CHRONIC TONSILLITIS AS ETIOLOGIC
FACTORS.*

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All pathologic work here reported was done by Dr. M. Armstrong. Dr. W. J. Foster assisted with the clinical observations.

Sinuitis in infants and young children presents many differences as compared with sinuitis in adults, from a diagnostic and therapeutic standpoint. The examination of the sinuses in this class of patients by some of the ordinary procedures used in the adult is quite out of the question. The probing and irrigation of the upper sinuses is especially difficult. The examination of the interior of the nose in any way further than by anterior rhinoscopy is very difficult. Because of such anatomical conditions as the smallness of the sinuses, and the thickness of their walls, the Highmorian antrum for instance, due to unerupted teeth, transillumination is not trustworthy.

The difficulty of investigating and diagnosing lesions of the sinuses in infants and young children, may perhaps be responsible for the opinion more or less current that such conditions are not common. The importance of the study of the sinuses in young children and infants, approaches that of its study in adults.

We believe that sinuitis in children two years of age or more is common. We also feel that it can produce just as deleterious results as sinuitis in the adult; and furthermore, that it may produce these results without presenting symptoms

*Candidate's thesis read before the American Laryngological Association.

which would be suggestive of its presence. It is possible for a child to have a suppurative discharge from the sinus into the nose which passes into the nasopharynx and is swallowed, and whose presence is not suspected. A much smaller discharge in an adult would give the usual history of a postnasal discharge. Even in an adult, occasionally the presence of diseased sinuses is overlooked. It is therefore not to be wondered at, in children, where the diagnosis is so much more difficult, that this condition is sometimes not discovered.

We were influenced to make a special study of this subject by the investigation of several cases of infective multiple arthritis, where the focus of infection was in the nasal sinuses and had been overlooked.

The first of these cases was a little girl eight years of age. She was referred to us for examination for the focus of infection causing her joint trouble. The examination showed chronically diseased tonsils, a small bunch of adenoids, and a slight anterior cervical adenitis. The mucous membrane of the nose was somewhat chronically inflamed. No free pus was found in the nose. The transillumination of the antra and frontals was negative. The X-ray of the sinuses gave no distinct blurring of any sinus. Several teeth were badly diseased and were removed. It was presumed that badly diseased tonsils and adenoids constituted the focus of infection.

On September 21, 1917, the tonsils and adenoids were removed; at the time of the operation each antrum was irrigated by inferior meatal puncture, and no pus was secured.

Some time after the removal of the tonsils and adenoids we received a letter from Dr. Byfield saying that since the removal of the tonsils and adenoids there was a slight but distinct improvement in the symptoms; that the pain was still present in the joints, and he felt because of the continuance of the acute joint symptom there was still a focus of infection which had not been reached. At this time the following joints were involved: Ankles, knees, elbows, the small joints of the hands and neck.

Upon receipt of this letter a second examination of the sinuses, not, however, including the puncture of the antrum, was carried out with a negative result so far as diagnosing any sinus disease was concerned. The gravity of the case, to-

gether with the probability of a focus of infection somewhere about the upper respiratory tract, led us to explore the various sinuses under general anesthesia. Each Highmorian antrum was operated upon through the inferior meatus; there was no pus in either antrum. The floor of the right antrum was covered with a much thickened and softened lining. The underlying bone in the floor had a superficial necrosis. Having found what was probably the focus of infection, the other sinuses were not opened. Pieces from the floor of the sinus were removed, examined, and the following is the pathologic report:

Chronic purulent inflammation of the lining wall of the antrum.

Gross Examination.—The specimen consists of a very small bit of bony tissue curetted from the antrum of Highmore.

Microscopic Examination.—The section contains small spicules of bone, surrounded by a loose connective tissue in which many fibroblasts, lymphocytes, plasma cells and polymorphonuclear cells can be seen. The blood vessel walls are thick, and near them is a round cell infiltration. No glands or epithelial tissue was found in the section, but the diagnosis of purulent inflammation was made because of the increase in fibroblasts, round cells and polymorphonuclear cells.

Note.—Here was a sinus that was negative on puncture, gave a negative X-ray picture; a sinus that contained no pus, but had in its floor a chronic purulent inflammation. The lining wall of the antrum had an underlying superficial necrosis. This was a condition meeting all of the qualifications of a focus of infection.

Two weeks following the operation Dr. Byfield reported that the acute pain in the patient's joints had entirely left her; some joints were markedly decreased in size. We felt that the focus of infection for the joints had been found. Further progress of the case proved this to our satisfaction.

Unfortunately, when the focus of infection is in the paranasal sinuses, as a rule we do not get the sudden and remarkable improvement following the operation upon the sinus that we get when the focus is in the tooth or tonsil. When we operate upon a diseased tooth or tonsil the offending organ is cut out and thrown away. The best we can do with a sinus

is to thoroughly drain and clean it out, and remove necrotic bone from its walls; with the very best of treatment a purulent discharge will occasionally persist for a long time, and after it has disappeared, will recur, the secondary manifestation disappearing and reappearing with the disappearance and reappearance of the pus. The proper treatment of such cases we will take up later.

A second case was to us even more instructive. This patient, a boy ten years of age, came into our service on January 17, 1917, with an acute suppurative otitis; at this time he had a multiple arthritis.

An examination of the nose, throat and teeth was carefully made. The examination was negative except for chronic tonsillitis and adenoids; these were thought to be the focus of infection and were removed. Two months later the patient had an acute exacerbation of his arthritis, and was referred to us again for examination. A second complete examination of the sinuses was made, including anterior rhinoscopy, antrum puncture, transillumination and X-ray examination. The only indication of sinus disease was a slight discharge in the upper posterior nasal cavity. A negative report is so far as the sinuses was concerned was returned.

Four months later I received a communication from Dr. Steindler saying that practically all of the joints except those of the spinal column were involved; that there was a focus of infection somewhere, and if it were not found all joints, including those of the spinal column, would soon be ridged and the child would be utterly helpless.

A third examination was made, and the findings were the same as before. It was decided to make an exploratory opening of the various sinuses.

The right side was operated upon first. Neither antrum, frontal or posterior ethmoidal sinuses were diseased; an anterior ethmoidal cell was found to contain pus. Soon after, the sinuses on the left side were explored; both the anterior and posterior ethmoids contained pus. There was also a very small amount of purulent material in the Highmorian antrum. In each side of the nose from the diseased sinuses a hemolytic streptococcus was secured.

Two weeks after the operation a letter was received from

Dr. Steindler saying that the patient had had a constant progressive improvement since the drainage of these sinuses.

We realize that chronic tonsillitis and adenoids are far more commonly the focus of infection in multiple arthritis in children than is suppurative sinusitis. Since our experience with these two cases we have never expressed the opinion, when asked to find the focus of infection in a child, that diseased tonsils and adenoids constituted the only probable focus in the upper respiratory tract. In such patients with chronic tonsillitis and adenoids, where the examination of the sinuses is negative, we always ask for the return of the patient for further examination, if, after the removal of the tonsils and adenoids, acute symptoms suggestive of continued infection persist. We believe that exploratory opening of the sinuses in children in severe cases of systemic infection is indicated, providing there is no other focus of infection found. Only do we believe such exploratory openings to be contraindicated when the nose is perfectly free from discharge, and the mucous membrane of the nose is normal. Such a condition should exclude sinusitis. The absence of pus in the sinuses does not exclude them as being foci of infection.

We are also of the opinion that in every child where, following the removal of diseased tonsils and adenoids, the parents are not satisfied with the improvement in the child's condition, an examination of the paranasal sinuses is indicated.

Coffin,¹ one of the pioneers of America, gives as the symptoms of sinusitis in children persistent discharge from the nose, repeated colds, intermittent stoppage of the nostrils, reflex cough, pain in head, an unaccounted for range of temperature, and anemia. He says the diagnosis is made by finding purulent or catarrhal secretion in the nose or nasopharynx, cleansing, using the suction and finding it again.

Wood² gives a most excellent description of the pathology of sinusitis in children. He says the difference between sinusitis in children and adults is due to two anatomic facts:

1. In childhood the sinuses are in an undeveloped state.
2. The surrounding bone is softer, with diploe—hence it is more open to extensive involvement.

He concludes that involvement in the early years of life is

less frequent and only seldom chronic; that when it does occur the destructive lesion of bone is more frequent.

He says that in a maxillary sinusitis the mucous membrane may become so edematous as to fill the cavity. This we have noted in an X-ray examination and the finding has been confirmed on operation. Later in this paper the pathology of such a thickened membrane is described.

He further says that chronic sinusitis may be cured by hyperplastic tissue becoming sclerosed and filling the cavity with fibrous tissue.

Coakley³ concludes:

1. Sinusitis in children is as common as in the adult.

2. Because of shallow cavities it has a greater tendency to spontaneous cure.

3. He concludes that in a child without adenoids, and with a profuse nasal discharge, the patient has sinusitis. Our observations show that a large percentage of cases with adenoids have chronic sinusitis.

He is an advocate of nonoperative treatment, suction, cleansing the nose, diet, and attention to the general health.

Mosher⁴ has given us some very practical points in connection with this subject. He says that the sphenoid in children is larger than we ordinarily expect it to be. In a boy of twelve he has found one of adult dimensions. We have seen such a sinus in a boy nine years of age. Warren Davis, in his specimens, showed me two cases of complete bony sphenoids at birth.

Mosher⁴ also says that from the third year on the antrum is large enough for surgical treatment. We have had several cases under two years of age where it seemed to be advisable to operate upon the antra. In one case eleven months old it was necessary to drain the antra.

A statement, which I believe to be original with Mosher, I think should be the basis of all of our clinical observations on the sinuses of children: "Precocious development of the sinuses may make any or all sinuses of surgical size earlier in life than we expect."

Casselberry⁵ feels that a certain class of chronic sinusitis in children requires conservative intranasal operation.

Myles⁶ thinks that intranasal operations in children is more frequently indicated than is done at this time.

Oppenheimer⁷ calls attention to the fact that at birth we may have antral sinusitis from injury (forceps) or infection from vaginal discharge.

Emil Mayer,⁸ in one of the earliest articles in American literature on this subject, concludes that the apparent rarity of sinus disease in children is due to difficulty in diagnosis.

Killian⁹ and Hubbard¹⁰ have discussed the question of sinusitis and infectious diseases.

Haike¹¹ gives a most excellent description of radiography of sinuses in children. He finds the antrum most often diseased; next to the antrum, the ethmoids.

Skillern¹² considers all sinusitis under the age of five as an ethmoiditis or as an osseous infection.

In this investigation of sinusitis in children we have confined ourselves to a study of those latent cases of chronic sinusitis which are so apt to be foci of systemic infection. We have not included cases with marked local complications due to osteomyelitis. These complications are more common with infections of the upper sinuses than with the Highmorian antra; although in our latent cases of antral sinusitis it was common to find sinusitis with necrosis of the floor without, however, external manifestations of such an involvement. We have also excluded cases due to recent acute infectious diseases or to syphilis; ozena cases were not considered. In every case of sinusitis studied, syphilis was excluded in so far as the Wassermann test would exclude it. In some of the more severe cases the same test was applied to the parents.

The production of superficial abscesses about the orbits and the discharge of the pieces of bone from these abscesses is much more common in sinusitis in children than in adults. This is due to the bone surrounding the sinuses being more cancellous in the child. In our investigations we have found so few cases of chronic sinusitis with this complication as compared with the rather large number without the complication, that we feel this should not be considered as one of the important diagnostic points for sinusitis in children.

We feel from a review of our cases that anatomic knowledge of the average size which any sinus should have at a certain

age is not so important, considering the fact that there may be a precocious development of any sinus so that it might be a surgical sinus much sooner than one would expect.

Ordinarily, we may expect that under the age of two years we are only dealing with the ethmoidal labyrinth; that the sphenoidal sinus developing as it does from the posterior superior lateral angle of the nasal fossæ, may be considered, so far as its diagnosis, symptoms and treatment is concerned, as an ethmoidal cell; that the frontal sinus not having extended into the frontal bone, may be viewed in the same way. Exceptionally, there may be a precocious development of the sphenoid, so that at birth there is a true bony sinus, separate and distinct from the ethmoidal mass. A study of the excellent collection of specimens of Dr. Warren B. Davis shows a true bony sphenoidal cell present at birth, and a true frontal sinus before the age of two.

Dr. Warren B. Davis tells me that we may ordinarily expect the sphenoidal sinus to be large enough at the age of five years so that sphenoidal infections might involve the second branch of the fifth, and that at this age the floor is usually descended low enough to approach the vidian. He reminds us that in a precocious sphenoid, the nerves mentioned may be involved very much earlier.

Sluder,¹³ from a study of Davis' specimens, concludes that the sphenoidal sinus may be separated by only an eggshell thickness from the second branch of the fifth nerve at the age of three years, and from the vidian at the age of five years.

The relation between the involvement of the sinuses and the sphenopalatine neuralgia, so well described by Sluder,¹³ applies to children as well as adults. The examination of sinuses in children with headache is indicated just as much as the examination of the sinuses in adults with a similar condition. We are never safe in assuming, without having before us at least the X-ray plate of the patient, that the size of the various sinuses is not large enough to produce headache if they are diseased.

The relation between sinusitis and systemic disease in children is very intimate. We have seen nephritis, cardiac lesions, pernicious vomiting, headache, asthma, arthritis, pulmonary lesions, chorea, hay fever, recurring coryza, neurotrophic dis-

turbance, laryngitis, mild systemic sepsis, persistent fever, relieved by the treatment of sinus disease. I do not think we should be guilty of the common error and even suggest that we have found a panacea for all these ills.

All of these cases mentioned are patients who have been studied by a pediatrician and by myself, where a distinct relation between the sinuitis and the disease was found. It goes without saying there have been many more cases similar to these that have not had any sinuitis. Because of the occasional relationship between the conditions mentioned and the sinuitis we feel that the sinuses should be carefully looked into from the etiologic standpoint in all such cases when the etiologic factor is not plain. All such cases should be studied by the head specialist and the pediatrician together.

Such a working arrangement we have found to be absolutely essential; in short, most of our very interesting cases are those who have been referred to us by the pediatrician for examination of the sinuses.

The relation between sinuitis and pulmonary conditions is very definite. Naturally, purulent infections of the upper respiratory tract would exert an influence upon the lower respiratory tract. The following are the opinions held by Dr. Scarborough regarding the relationship between infections of the upper respiratory tract and pulmonary lesions:

The infections of the respiratory tract, sinuitis, adenoids and diseased tonsils are a part of the vicious circle in pulmonary tuberculosis. These infections in children have a deleterious action upon the lungs just the same as poor hygienic surroundings, poor food or overwork. The removal of these infections has a similar beneficial influence as the removal of any of the other conditions mentioned. Sometimes the removal of tonsils and adenoids, or the relief of sinuitis, result in an apparent cure of the pulmonary lesion. The cure is really due to the organism having only one infection to combat rather than two.

Since July 1, 1917, we have studied the sinuses of two hundred and thirty-four children suffering from adenoids who have come into our service, and in those cases referred to us by Drs. Byfield, Steindler, Scarborough and others, to ascertain, if possible, the cause of some systemic disturbance. As

these observations have been made only since July 1 last, in many cases the study has not yet been completed.

We have been surprised at the results of our investigations of sinuses in children suffering from adenoids and chronic tonsillitis. Two hundred and thirty-four children, thirteen years of age or younger, with adenoids were examined; many of them also had chronic tonsillitis. The examination consisted of an anterior rhinoscopy followed by radiography. When sinus trouble was even suggested by the X-ray plates, a more complete examination was carried out. In thirty-four out of two hundred and thirty-four children, or in about fifteen per cent of the cases, a chronic empyema of one or more sinuses was found. In every case where a diagnosis of chronic empyema was made, a Wassermann test was applied and, if positive, that case was excluded from our list. None of the thirty-four cases mentioned above had a positive Wassermann.

We have been led to believe by a study of sinusitis where the adenoids and tonsils had been removed for some time and a persistent sinusitis was present, that the increase in adenoid tissue, sometimes referred to as compensatory tissue which is so frequently noted in the pharynx and nasopharynx following adenoidectomy and tonsillectomy, was the result of infection from these sinuses. In every case where we have noted the presence of this adenoid tissue a chronic sinusitis had been present. All cases of chronic sinusitis have not, however, had this increased adenoid tissue in the pharynx.

We will divide the study of our cases into the following subdivisions:

1. Pathology.
2. Diagnosis. This we will divide into
 - (a) History.
 - (b) Presence of nasal and postnasal discharge.
 - (c) Condition of the mucous membrane of the nose.
 - (d) X-ray examination.
 - (e) Examination with the nasopharyngoscope.
 - (f) Puncture and irrigation of the Highmorian antra, and exploratory opening of the other sinuses.
3. Treatment:
 - (a) Nonoperative.
 - (b) Operative.

(c) Postoperative.

4. Results:

Pathology.—A survey of the literature shows that very little has been written upon the microscopic findings in sinusitis of children. With the exception of one very excellent article by Wood,¹⁴ no one seems to have dealt directly with this subject. There are probably two reasons for this: First, the pediatricians and even the rhinologists have not recognized the probability of finding sinusitis in children, and second, because it has not been pointed out that there is an essential difference between the histologic findings in children and in adults.

Wood, however, in the article just referred to, mentions one point of difference which seems worthy of further study. The bones in early childhood are softer and more easily attacked than in the adult. Our observations tend to establish the fact that in cases of equal clinical severity and with equally marked changes in the mucous membrane, there is much more apt to be an involvement of the underlying bony wall in the child than in the adult.

The findings in the case of F. R., age eight years, will serve as an example. The antrum was practically empty, containing only a small amount of mucous. A small bit of tissue removed from the floor of the antrum at the time of operation and prepared for microscopic examination gave a typical picture of granulating ostitis. This question of bone involvement is one of great importance.

Zuckerkindl¹⁵ makes the statement that he has never observed bone caries as a result of an empyema. Where he finds an empyema accompanied by necrosis or disease of the bone he takes the position that the bone caries existed and is the cause of the empyema. Grünwald,¹⁶ on the other hand, takes the position that the empyema usually exists first and that the bone necrosis is secondary to it.

Hajak¹⁷ states that an acute empyema may end in three ways: There may be complete restoration of the tissue; the process may become chronic; or there may be an ulceration of the mucous membrane with caries of the underlying bone and the formation of abscess with or without a fistulous opening. The latter condition is, he says, seldom seen and then

only following the most severe infections. In the footnote he adds that Zuckerkandl and E. Frankel have not seen such a condition. Dmochowsky speaks of it as a not infrequent ending.

Under "unusual pathologic complications or sequelæ of chronic inflammation," Skillern¹⁸ mentions new formation and ulceration of bone, caries, and necrosis. Concerning ulceration of bone, he says: "The condition seems to be dependent upon an especially virulent infection, being always accompanied by ulceration of the superimposed mucous membrane. Actual destruction of the osseous wall is relatively rare."

These authors dealt very largely with sinusitis in adults. It is more than probable that had their observations been confined to sinusitis in children, bone involvement would have been noted far more frequently.

In children it is probable that the primary infection is usually overlooked, and it is, as a rule, only those cases where there is destruction of bone and subsequent spreading of the inflammation to the soft tissues of the face that come to the notice of the physician.

All of our cases have been of the chronic latent type. In only this particular, the high percentage of cases of periostitis and inflammation of bone, have they differed from the classical description given by Dmochowsky and followed by Hajek and many other writers.

The membrane is thickened, due to an increase in the fibrous tissue elements, especially in the form of young fibroblasts, and to an edematous infiltration into the connective tissue interspaces. The basement membrane is usually very prominent, and in the upper portion of the connective tissue there is a more or less marked cellular infiltration. The majority of these cells are lymphocytes. Plasma cells, polymorphonuclear neutrophile leukocytes and eosinophiles are occasionally seen. This infiltration is especially marked just below the basement membrane. The mucous glands when present often show signs of increased activity, as indicated by enlarged cells containing globules of mucus. Round cell infiltration and fibrous connective tissue thickening are often very prominent about them. The epithelial layer varies in structure from the normal ciliated columnar epithelium to a stratified, cuboidal

epithelium, very closely resembling the stratified squamous in type.

Frequently the epithelium is very largely desquamated, leaving the basement membrane bare or sparsely covered with a few ragged cuboidal cells. When the epithelium is columnar in type, many beaker cells are seen along the surface. Lymphocytes and polymorphonuclear leukocytes are often seen infiltrating the epithelial layer and lying upon the surface. Several instances have been observed where the superficial layer of the mucous membrane has been replaced by granulation tissue.

History.—Perhaps the most common symptom in our cases of sinusitis has been sneezing; other prominent symptoms are recurrent stoppage of the nose, frequent colds, discharge and headaches. The history of postnasal discharge so common in the adult is conspicuous by its absence.

Nasal and Postnasal Discharge.—The finding of mucopurulent discharge in the nose anteriorly or in the nasopharynx is always very suggestive of sinusitis.

The Condition of the Mucous Membrane of the Nose.—A dark red, thickened, boggy mucous membrane or enlarged, boggy turbinates are suggestive of sinusitis. We have never found sinus disease present in the nose of a child free from pus and with a normal mucous membrane. We have found present a slight amount of discharge with diseased mucous membrane where we have been unable to find sinus disease. We are inclined to feel that these cases have had sinus disease which could not be located.

The first step in our examination for sinusitis is to note the condition of the mucous membrane of the nose and the presence or absence of discharge. In our earlier studies transillumination was used as a diagnostic method. We still use it in children over eight years of age. In children under eight years of age the transillumination of the frontals has been very misleading. The very thickened floor of the antrum with the unerupted teeth interferes with the transillumination of these sinuses.

X-ray Examination.—Immediately following the examination of the nose by anterior rhinoscopy, an anteroposterior and lateral X-ray picture is taken. It is much more difficult to get a satisfactory X-ray picture of sinuses in children than in

adults. The children are unruly, and with infants and young children it is necessary to administer an anesthetic. Even with the child anesthetized, the difficulties are greater. The outlines of the sinuses in children are not so distinct as in the adult, because the bone surrounding the sinuses is cancellous, consequently soft, and does not give the distinct outline to the sinus which we get with the hardened bone of the adult. Nevertheless, the X-ray picture of the infant plays a much more important part in the diagnosis of sinus disease than in the adult. In the infant and child, we are not safe in assuming from our anatomic knowledge, that any sinus is or is not a surgical one. One X-ray picture gives to us this definite information. The information regarding the size of the sinus is a very important step in the clinical diagnosis. If there are no sinuses, or if they are too small to be surgical, our minds are relieved; if the sinuses are large, then we must find out whether or not they are diseased.

In infancy and later until the frontal sinus invades the horizontal plate of the frontal bone, the picture of the frontal sinus is confused with that of the ethmoids. As soon as the sinus extends into the horizontal plate of the frontal, then the X-ray picture distinguishes it from the ethmoids and it can be separately diagnosed. Such a picture we have found present at the age of two years. Haike says that at the age of five years twenty-five per cent of the children have the frontals distinguishable in the X-ray plate. The ethmoidal sinuses show particularly plain in children, at least compared with other sinuses.

Valuable information, even in infants just a few months old, can be secured regarding the Highmorian sinuses in connection with their location, size, and as to whether or not the floor of the sinus extends below the inferior turbinate. Disease of the sinus is usually diagnosed. We have found marked diseased Highmorian sinuses in an infant eleven months old. This case was operated upon. The antra were filled with thick white pus. The patient had a posterior cleft. It was advisable to eradicate the sinus disease before closing the cleft. In this case two streams of pus could be seen flowing down on the posterior wall of the pharynx; the ethmoids were also diseased. The patient had a negative Wassermann. We have

had two other cases under the age of two years, where it seemed advisable to operate upon these sinuses. We have noted in the X-ray plates of the antra of children what seemed to be a fluffy mass. Such sinuses we have found to be almost filled with a very thickened edematous membrane, the pathology of which is as follows:

The microscopic section shows a tissue four to eight times as thick as the normal mucous membrane. The connective tissue is increased in amount, and has wide interspaces which may be filled with a homogeneous, faintly pink staining material. The mucous glands are increased in size, the acini are often distended with mucus. The upper layer of the connective tissue is more or less infiltrated with cellular elements, the majority of which are lymphocytes; a few plasma cells and eosinophiles, and sometimes polymorphonuclear cells, are present. The basement membrane is usually very prominent. The epithelial covering may be normal in appearance or may be composed of stratified cuboidal cells.

The X-ray Examination of the Sphenoid.—The sphenoid sinus is so covered with bone, in young children and infants, that I doubt if its diseased condition can even be definitely diagnosed from the X-ray plate. We may, however, determine whether or not it is present, and approximately its size, the most important thing. We have also felt that a clear sphenoid picture excluded sinus disease and that we secured definite negative information.

In one case, a girl fourteen years of age, who came under our observation, we wrongly interpreted the sphenoid shadow. The sphenoid was exceedingly large, and was clear. The examination with the nasopharyngoscope, however, revealed pus coming from its ostium. Operation upon the sphenoid revealed a very large cell, badly diseased.

A blurred sphenoid may be so because of overlying bone and is not necessarily positive for a diseased sinus.

The examination of the middle and superior meatus of the nose in young children and infants, with the nasopharyngoscope, presents several difficulties. It is very difficult to hold the child's head quiet; the mucous membrane is very delicate and bleeds easily with a resultant blurred field. We have tried using adrenalin in the nose before making the examination

and, while adrenalin spoils the typical picture, we have felt that we secured the best information after its use, because we avoided hemorrhage and could get a fairly good view.

When a general anesthetic was administered for the removal of tonsils and adenoids, or for the taking of an X-ray picture, we have tried to use the nasopharyngoscope; we use only ether for anesthetic, and it soon fills the nose with mucous, which has interfered with a successful examination.

Notwithstanding the difficulties in using the nasopharyngoscope in this class of patients, we have found it a most important aid in the diagnosis of sphenoidal and posterior ethmoidal disease.

In one case, eleven years of age, sphenoid trouble was diagnosed on one side and absent on the other, the diagnosis being confirmed on the operating table.

Diagnostic Puncture and Irrigation of the Highmorian Antra and Exploratory Opening of the Other Cells.—Puncture of the antrum of Highmore in infants and young children is a routine procedure with us with our patients suffering from adenoids, where the X-ray picture is suggestive of Highmorian sinus disease. The puncture is made at the time of the adenoid operation. If reasonable care is exercised we do not feel there is danger of puncturing the orbit, going through the outer wall of the antrum or of injecting fluid in the cancellous structure of the bone. In all of our cases where puncture has been made, we have had before us an X-ray picture showing the location of the sinus. In every case we have had, the antrum could be punctured by inserting the needle upwards from the inferior meatus.

A study of Warren Davis' specimens shows that in all of them the antrum may be entered from the inferior meatus. If an antrum should be so highly located that this could not be done, the X-ray picture would reveal the fact.

Since July 1 last, we have punctured one hundred and forty antra in children and have not had any bad results. The pus comes from the antrum in a small mass, and we do not believe it can be confused in any way with the discharge that may be left in the nose after it is cleansed, even in young children. The presence of pus in the antra has made a positive diagnosis.

In cases where we thought there might be a simple drainage of pus into the Highmorian sinus, the lining of the sinus has been examined and found diseased. Usually there was bone involvement in the floor of the sinus. The absence of pus does not exclude sinus disease. With no pus, there may be diseased membrane, and underneath it necrotic bone.

Treatment.—Nonoperative: We have not had opportunity of pursuing the nonoperative treatment as far as we would like. Naturally, only those patients were operated upon, where irrigation of the sinus together with the removal of the post-nasal obstruction, did not bring about a cure. Our patients were charity cases living far from the hospital, and relief must be secured in a minimum amount of time. In many of the cases the sinuses were foci of systemic infection, and it was advisable to hasten the cure as much as possible.

Operative.—The operative treatment we have divided into two classes:

- (a) Removal of the cause of sinuitis.
- (b) The operation upon the sinuses themselves.

In none of the young children or infants studied have we found deflected septa or exostoses that we thought could be responsible for the sinuitis.

From our series of cases with adenoids, most of them having diseased tonsils, we found thirty-four cases having suppurative sinuitis. Of the thirty-four cases of sinuitis in children with adenoids, thirteen had a history of having previously had an acute infectious disease. So many of these patients became well after the removal of the tonsils and adenoids that we felt the acute infectious disease was not a very important etiologic factor.

In some of Warren Davis' specimens I noted that large bunches of adenoids extended from the nasopharynx downward and forward so far as to form, with the roof of the nose, an angle of about sixty degrees. Such a condition is naturally the best kind of a trap for the collection of secretion which is driven backwards in the nose to the nasopharynx. Adenoids in this way may keep in the upper posterior part of the nose constantly a mass of secretion which, being stagnant, would soon become mucopurulent. This is one of the ways in which adenoids may cause sinuitis.

In three cases of bony posterior atresia of the nares, two had pansinusitis on the side occluded. I have recently had the opportunity, through the courtesy of Dr. Prentiss, of examining a beautiful case of complete bilateral bony anterior atresia in an adult. The specimen was found in the anatomic laboratory. The sinuses were perfectly developed and normal: quite different from my findings in posterior atresia.

In all of our cases of chronic sinusitis here related, when the sinus disease was not acting as a focus of systemic infection, the treatment has been the removal of the tonsils and adenoids without any after-treatment whatsoever. We have them wait five or six weeks, and then make a second examination. These cases have only been studied during the last six months, and many have not returned as yet for examination. A later report will be more comprehensive. Of seven cases where chronic suppurative sinusitis accompanied adenoids and diseased tonsils, five patients on return several weeks after the removal of the tonsils and adenoids, were found to be apparently well. So in children as in adults, the main thing in the treatment of chronic sinusitis is the removal of the cause. The operative procedures we have used are as follows:

Position.—In operating on the antra, the patient lies on his back, and the pharynx is kept clean with the suction apparatus. In operating on the frontal, ethmoids, and sphenoids, the same position is used, but two pieces of suction apparatus are necessary: one to keep the pharynx and nasopharynx clean; the other, with a nasal attachment, is used for cleansing the interior of the nose. Even in very young children this gives us a very clear field. For the sphenoidal, ethmoidal, and frontal sinuses, we use very small curettes to break down and cleanse the cavities. Sluder's operation gives excellent results. In most of our cases we have operated only upon the Highmorian antra, the upper nasal sinuses being treated by suction after the operation.

We have never performed an operation through the canine fossa in young children or infants. We never expect to do such an operation, because of the injury to unerupted teeth. Except in two cases, all operations upon the Highmorian antra were performed without loss of turbinate tissue. In two infants it was necessary to remove a very small piece from the

anterior end of the inferior turbinate bone. Our procedure for intranasal drainage of the antra is as follows:

Using a pair of blunt Knight's forceps, the whole of the inferior turbinate is rotated outwards and upwards. After this rotation is complete, the inferior margin of the turbinate points up and out. This gives us just as good an exposure of the inferior meatus as the removal of the inferior turbinate. After the operation is completed, the inferior turbinate is replaced, and retains its original position without any apparent ill effect whatever from having been turned upward. The turbinate is elastic. There is no noticeable fracturing of the turbinate when this is done.

The size and location of the antrum and the position of its floor are accurately determined from the X-ray picture. After the turbinate is turned up and out, an opening is made through the inferior meatal wall; hypertrophied and necrotic areas within the antrum are curetted, the floor being specially examined for such conditions. The opening in the inferior meatus remains open usually long enough for healing; if it closes it is readily reopened. Eventually, the meatal opening always closes, and as a final result we have the nose apparently intact and normal.

In infants about one year old, in draining the antra, one finger is placed in the orbit. A very small curette enters the antrum above the middle turbinate. The curette can be felt by the finger in the orbit, when it strikes the very elastic wall of the sinus. The ethmoids are removed with a ring curette.

Postoperative Treatment.—Suction, irrigation of the nose with salt water, followed by some oily spray, is our routine treatment in all cases. If the antrum is operated upon, it is irrigated daily with argyrol; if this is not sufficient, five per cent silver nitrate is used. The suction treatment has been used, even with infants. The best postoperative treatment is plenty of sunshine and out of door life. In the late fall, winter and spring it is best if the patient can go to a climate with abundance of sunshine and warm air. Many of our patients are not able to do this, and a long course of postoperative treatment is necessary.

Results.—With the exception of two cases, the result has been good. In two cases, after weeks of treatment, pus re-

appears as soon as the treatment is discontinued. The cases in this series, however, have all been studied since July 1 last, and the fact that the sinuses at this time are apparently well does not mean they are permanently cured. The following are some of the interesting things noted in our work:

It is not uncommon in removing tonsils and adenoids or operating on the sinuses in children, with joint infections, to have the joint trouble made more acute, accompanied by a rise of temperature. These results we have assumed to be due to local manipulations of the focus, resulting in increased systemic infection; this we believe is not always the case. In two cases of acute multiple arthritis, when there was a persistent sinusitis after operation and it was necessary to use silver nitrate, etc., it was found that following each treatment there was a rise in temperature; cessation of the treatments prevented these excursions. The treatments were given again, great care being used not to traumatize the joints, without any rise of temperature whatever. Our conclusion is that in operating on cases with arthritis the greatest care should be exercised not to traumatize the joints.

In cases of severe systemic infection and inability to localize the focus of infection, an exploratory operation of the sinuses, especially the ethmoids, is indicated unless the complete absence of discharge in the nose, perfectly normal turbinates and mucous membrane contraindicates sinusitis. In the adult, sphenoidal disease cannot positively be excluded except by opening the sphenoids; in children, the same is true of the ethmoids.

The following are a few cases which present points of interest:

Baby B. A., age sixteen months. This baby was in the pediatric service with a diagnosis of unresolved pneumonia. The patient was referred to us for examination because of a very purulent discharge from the nose. Adenoids were present. The Wassermann examination was negative. Owing to the patient's condition, an X-ray examination was not advisable. Diagnosis, adenoids. Two weeks later the baby died. The autopsy revealed frontal sinuses absent, the ethmoid cells filled with polypoid membrane and bathed in pus. The sphenoidal sinus was very minute, with no macroscopic evidence of disease. The antra contained no pus or other fluid. This

was one of the earlier cases, and it was assumed that the adenoids were responsible for the nasal discharge. The true suppurative condition was revealed only at autopsy.

Baby L. O., age nineteen months. Referred by the department of pediatrics for examination of the nose. The diagnosis was neurotrophic disturbance; the condition of the child was quite critical. Our diagnosis was suppurative ethmoiditis, Highmorian sinusitis, and probably sphenoiditis. No adenoids were present. The Wassermann was negative. All of the diseased sinuses were drained. The sinusitis would disappear with postoperative treatment, and reappear with the stoppage of the treatments. We were informed by the pediatricist that the benefit to the general condition from the treatment of the sinusitis was eminently satisfactory.

I. H., age seven years. This is such an interesting case that I take the liberty of reporting the history in full.

The patient came in our service December 13, 1917. Since one year of age he has had a tendency to develop a temperature of 101 without apparent cause; more noticeable when he has a cold, but is present when he does not have one. Last spring the tonsils and adenoids were removed. Since then there has been quite an improvement in this elevation of temperature. He was referred to us by Dr. Scarborough and Dr. Byfield for examination. Intracutaneous tests for tuberculosis were positive; other tests were negative; chronic bronchitis as a very old process.

We found chronic bilateral pansinusitis with a marked cervical adenitis.

December 15, 1917. Treatment.—Drainage of all of the sinuses, followed by suction and irrigation.

The following abstract from Dr. Byfield's history was taken on December 21, 1917:

Has had attacks of fever with respiratory infection and enteritis since one year of age; only two attacks since the removal of the tonsils and adenoids in May, 1917. For many years chronic nasal discharge which has had a tendency to become purulent. The patient has had in the last few months a very irregular temperature; sometimes going to 102 without evidence on the part of the patient. Lungs: Numerous râles

which improved very much within five days following the drainage of the sinuses.

Under the date of January 15, 1918, just one month following the operation, we received a letter from the boy's father saying that since the operation there had been no fever.

This case is mentioned only as a patient very incompletely observed. It would be very difficult for us to conceive with the postoperative history today, that the disease of the sinuses was not exerting a decided influence upon the condition of the patient. It will be interesting to observe the future progress of the pulmonary condition and temperature.

CONCLUSIONS.

1. Sinuitis in young children is not rare.
2. Where there seems to be a focus of infection in the upper respiratory passages causing a systemic disease, and the removal of tonsils and adenoids does not check the acute process, the sinuses must be very carefully examined.
3. Adenoids are a very common cause of sinus disease. Their removal usually causes a cure.
4. In arthritis cases, increased joint trouble following operation on the nose and throat is not always due to increased infection, but may be due to traumatizing the joints.
5. Intranasal drainage of the Highmorean antra may be done in infants and young children without injury to turbinate tissue.

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XXXIII.

ADENOCARCINOMA OF THE NOSE. REPORT OF FOUR CASES.

BY LEE M. HURD, M. D.,

NEW YORK.

Adenocarcinoma of the nose is rare enough to warrant reporting each case.

From clinical or microscopic findings, it is hardly possible in the early stages to determine whether the growth is of a benign or malignant character, and I should urge that all such growths be looked upon as of low grade malignancy.

Dr. Jonathan Wright, dean of rhinologic and laryngologic pathology, has fully discussed this subject,^{1 2 3} and I have had the good fortune to have him examine all the specimens from these four cases.

From a feeling of triumph in surgery to one of humility, I report the subsequent history of Case 1, previously reported in the *ANNALS OF OTOTOLOGY, RHINOLOGY AND LARYNGOLOGY* of June, 1907. ("Adenocarcinoma, Situated in the Right Maxillary Antrum, One Year and a Half After Operation.")

Case 1.—C. F., aged fifty-nine years, United States; occupation, milkman. Previous history, negative. First seen on December 6, 1905, when he gave the following history:

Twelve to fourteen months before, he began to notice swelling of the face and hard palate. For the past ten years, he says, he has had a small swelling on the alveolar process. The teeth on that side fell out about five years ago, also some on the opposite side. The subjective symptom which the growth gave was nasal obstruction. The growth, where it had broken through the bone, had a cystic feel. The swelling in the mouth has obliterated the usual landmarks, and was one smooth swelling from the gingivolabial fold well beyond the median line, involving the alveolar process as far as the left canine tooth. The anterior surface of the growth bulged the cheek markedly on that side and overrode the intraorbital

ridge and the nasal bone. The nasoantral wall bulged into the nose, and pushed the septum over until it touched the opposite side. The growth had caused absorption of the bone in several directions, namely, the anterior and inferior antral walls, and probably the nasal walls. His heart and lungs were normal, kidneys slightly congested. He had been a steady whisky drinker for years, averaging about ten drinks daily.

The superior maxilla was excised in toto. The gross section of the specimen showed a mass, creamy yellow in color, granular, not vascular, the consistency of the spleen.

The growth was submitted to Dr. Jonathan Wright for examination, who reported as follows:

"This growth is an adenoma. The interest, both clinically and histologically, is whether we are to consider it malignant or benign. In many places, the type is one of simple row formation, run wild, but not clustered into irregular clumps of cells, which in this kind of case I have been accustomed to associate with malignancy. In several of the places, however, this massing of the cells in the stroma is evident. In these localities, and a few others, a little suggestion of stricture is to be noted. In other places, the cells are arranged around a blood vessel for a center. In these sections, I do not make out any of the irregular karyokinesis, which is a striking intracellular feature in malignant growths. From my experience with such cases as this, I am inclined to think, in spite of several very dubious areas, that there is a good chance that this growth, even with repeated recurrences, may finally be entirely and permanently eradicated. If possible, the site of the growth should be promptly exposed, so that any recurrence may be observed and extirpated."

December 21, 1905, Dr. Wright sent me this supplementary report:

"On examination of other portions of this growth, I am inclined to think we must give up any hope of its nonmalignancy. There is too much atypical proliferation not to expect prompt recurrence and metastases."

June, 1908, the growth recurred on the hard palate, and half of the left alveolar process and hard palate were removed.

Dr. Wright reported: "Sections of the growth removed on June 18, 1908, show the original adenocarcinomatous growth."

January, 1910. Removed right molar and surrounding tissue, except the skin.

March, 1910. Removed eye and contents of orbit.

May, 1910. Admitted to hospital with rapid extension into soft palate.

December, 1911. Specimens of the growth showed the same histologic characteristic.

July, 1914. Much involvement in orbit and soft palate.

He has lost considerable weight and looks badly; no metastases, does not complain of pain, no bleeding, no tendency to break down and ulcerate.

Saw him again in 1914. This time in a city hospital. No longer able to work. Growth has grown very slowly since 1910. Passed from observation after nine years.

Case 2.—A. C., age sixty-five years, married; retired naval officer. April, 1908.

Ten years ago he had first operation for nasal polyps and has had a number of such operations since. Twenty months ago, in Italy, his polyps were removed, which was followed in three weeks by rapid enlargement of the cervical glands at angle of jaw on both sides, with a gradual increase in size and number since. He has had several operations for the polyps in past years.

At present he has severe headaches, extending from frontal to occiput, nearly complete nasal obstruction, mucoid nasal discharge, which is, at times, streaked with blood, the amount of blood increasing the last three weeks.

The left eye shows paralysis of third and fourth nerves, fundus normal, cervical glands extensively involved, large and hard, probably some involvement of abdominal glands, cachectic. Begs relief from pains and nasal obstruction.

Nasal examination reveals ethmoidal region blocked with what appears to be polypoid degeneration, which bleeds excessively on probing.

A gland was excised from the neck.

Dr. Wright says: "There is little or no lymphoid tissue left in this gland. Its framework, for the most part, is a low grade connective tissue. This is infiltrated throughout with patches of cells, some of them arranged in the lymph spaces in such a manner and are of such a morphologic appearance

as to suggest that they are metastasic deposits of an adenocarcinoma."

Quite a hopeless condition, but the patient demands a consultation with the man who has been busy removing the polyps for the past eighteen months, and this doctor is quite incredulous as to its malignant nature and, as I refuse to operate, the patient returns to this doctor three weeks later, and dies on the table, of hemorrhage.

Case 3.—C. C., Italian, age forty-two years, male, married. March, 1911. Robust health; for the four months previous, partial obstruction and increased mucoid discharge; frequent bleeding. Nasal examination reveals left ethmoidal region filled with a soft, purplish growth, which bleeds easily on probing.

March 4, 1911. Specimen removed for examination.

Dr. Jonathan Wright reported "adenoma." "This seems to be of the same nature of the former specimen from the case—that is, it is an adenoma of uncertain potentiality, better, perhaps, to call it a cyst adenoma. Long, slender, non-ciliated epithelial cells are growing wild from a much altered stroma, which, however, they do not infiltrate, but from false acini and tubes, giving it the peculiar characteristics from which it takes its name.

The stroma is made up largely of a hyperplasia of the smooth muscle fibers or cells, resembling them both in cross section, and when viewed longitudinally through their terminal portions, perhaps, due to improper technic, are not shown satisfactorily.

While it is possible that the course of this growth left to itself would rapidly present evidence clinically of malignancy, it is not impossible that thorough eradication, if that is possible, might lead to a favorable result."

Operation.—Tied external carotid, and with a Ferguson incision, which was extended up to and through the eyebrow, with the soft tissues retracted, the bone of the anterior walls of the antrum, nasal cavity and frontal were removed, and through this large aperture the entire contents of antrum, frontal, ethmoids, sphenoid and nose were removed, leaving only the mucosa of the vestibule.

There was no evidence of the growth except in the ethmoidal cells.

Microscopic Diagnosis.—“Very atypical looking adenomatous structure in the tissue from ethmoid, but very little of it. Gland is inflamed, but shows no evidence of metastases.”

September, 1911. Same condition was found in the right ethmoids.

The original incision was reopened and the nasal septum entirely removed, and all of the contents of the right naris and sinuses removed, except the frontal sinus with no evidence of the growth except in the ethmoids as on the left side.

Microscopic diagnosis, September 6, 1911, by Dr. Jonathan Wright: “This still presents the characteristic histologic features of a malignant adenocarcinoma.”

November, 1912. Growth recurred in the scar tissue behind the root of the nose, with the same microscopic findings.

April, 1914. Diathermy tried with some improvement.

May, 1914. Growth appeared through cicatrix near inner canthus.

March, 1917. Slowly extending. Radium applied once a week. Left frontal sinus cavity filled with the growth, which was opened and curetted, and radium applied direct by Dr. Bissell of the Radium Institute.

May 19, 1918. The mass inside at root of nose slowly increasing in area; more involvement at inner canthus and a point presenting itself in eyebrow.

Now he has some pain from pent up secretion in frontal, which disappears when the secretion evacuates itself. No metastases. He has lost some weight under observation to date, seven years.

Case 4. F. F., age sixty-seven years, married, male; manufacturer. April, 1915. Robust health; seven years ago had polyps removed; again, three years ago; anosmia, neuralgic headaches, dating back for many years, not associated with nasal condition; no bleeding.

Examination.—Mucosa much hypertrophied; septal deviation to left; left ethmoidal region filled with polyps. No metastases. Transillumination, clear.

April 21, 1915. Removed polyps and ethmoidal labyrinth. At about the middle of the ethmoids I discovered tissue dis-

tinctly different from the polypoid degeneration, it being soft, yellow and practically bloodless, and of the same character as that of Case 1.

This growth was removed in small pieces with forceps, because of the septal deviation, the total amount filling a bottle.

The pathologic reports are as follows:

Dr. F. F. Sondern's report: "Histologic Examination.—The specimen consists of a few flattened and irregular masses of grayish tissue, with a moderately firm consistency and a finely papillomatous appearance.

"Microscopic examination shows a papillomatous, hyperplastic growth of the upper nasal mucosa diffusely infiltrated with inflammatory cells (polynuclears, eosinophiles and lymphocytes).

The growth exhibits a marked tendency to convoluted and plicated arrangement, preserving at the same time a papillary structure. The cells are of the ciliated columnar type and are proliferated to form several layers.

Vacuolation, due to edema, is of common occurrence in the cells. Goblet cells are plentiful. The basement membrane appears to be intact. There seems to be little evidence of anaplasia on the part of the hyperplastic epithelium. The supporting stroma is of loose connective tissue formation and markedly edematous, and contains many thin walled blood vessels, which are for the most part empty. A few finely pigmented endothelial leucocytes are seen in the stroma.

Mitotic figures in the epithelial cells are rare, and in view of the hyperplastic nature of the growth it would seem that this is an important point in considering the question of malignancy.

From a histologic point of view, the tissue shows sufficient departure from the type to warrant regarding it with considerable suspicion as to its potential malignant capabilities, but at the present time it does not possess the structure of a frank carcinoma.

"Such hyperplastic growths in the nose, however, are prone to recur, and may take on malignant characters."

Pathologic report of R. M. Taylor: "Gross.—An irregular papillary mass weighing about one gram.

"Microscopic.—The growth consists of heavy columns of

epithelial cells several layers in thickness, cuboidal to columnar in shape, and having cells on the surface. They are supported by a branched meshwork of loose stroma, from which they are sharply demarcated. The cells are large, bladder-like and poorly stained. Proliferation is not very rapid, as only one dividing form was found. The specimen does not show whether the deeper structures are being invaded or not. Inflammatory cells of both the polynuclear and mononuclear type are scattered throughout. A tumor of similar nature and structure is figured in Wright and Smith's textbook on page 244. We do not believe that it is likely to metastasize, but may recur locally.

"Diagnosis.—Papillary adenoma."

The report of Dr. L. W. Strong: "The tissue consists of a plexiform epithelium with a minimal amount of stroma between the epithelial cells. There is no cornification. The cells, in places, are highly cylindrical. There is no gland formation.

"Diagnosis.—Epithelioma cylindrocellular plexiform."

Report of Dr. Jonathan Wright: "The examination of the specimen sent by you revealed an epithelial growth, probably malignant in nature, which should be classified, as far as I can judge from the small piece at my disposal, among the adenocarcinomata.

"The question of operation would depend entirely upon the clinical indications—that is, as to how far the thing had progressed, its situation, the general state of the patient, etc.; but, as you know, this form of growth is not so malignant as some others in the nasal cavity and, providing it was surgically possible to remove all the diseased tissue, it is an entirely justifiable procedure."

X-ray showed cloudiness in left ethmoidal region and antrum. Antrum was douched, with a clear return flow.

May 24, 1915. When the ethmoidal region had healed, it showed a suspicious spot about one-fourth inch in diameter on the anterior lateral ethmoidal wall.

Radical operation urged, but was refused. Patient died twenty months later in the South, after some six months, of a cerebral condition that was called meningitis.

Dr. Jonathan Wright has found that adenocarcinoma is the most frequent malignancy of the nose.

Rosenheim⁴ finds it the rarest.

Though it is the least malignant, two of my cases had recurrences after most extensive excision: Case 1 in two years, and Case 3 in one year, and also in Case 4 after intranasal removal, but here I knew I had not gone beyond the infiltration. The point of origin was clearly the ethmoids in Cases 3 and 4, and probably in Case 2.

In Case 1, the growth was entirely within the antral cavity, but too extensive to be sure of point of origin, but probably antral. Pain: Not until very late.

Hemorrhage early in Case 3, but not in the recurrences, late in Case 2.

Polyps were associated in Cases 2 and 4, while Case 3 gave clearly the appearance of a new growth in the ethmoids.

Dr. Jonathan Wright and Semon hold that a benign growth does not degenerate into malignancy. The polyps were merely a coincident. Thousands of polyps are removed repeatedly with malignancy observed only a few times.

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XXXIV.

REPORT OF A CASE OF FOREIGN BODY (CARPET
TACK) REMAINING TWO YEARS IN BRON-
CHIAL TUBE WITHOUT PATHOLOGIC
SYMPTOMS.

BY DUNBAR ROY, M. D.,

ATLANTA.

In the present day refinement of bronchoscopy it seems much out of place to report a foreign body as remaining in the bronchial tube or even in one of the twigs, without its removal. Authors always publish their successes, but few have the temerity to report their failures.

The writer has done but little clinical bronchoscopy, for he long ago realize that this work should only be undertaken by men who, from a natural aptitude in working along this line, have placed themselves in a position to have these cases referred to them, increasing thereby their clinical experience and rendering themselves more proficient in obtaining good results.

The writer believes that there should be such a thing as a peroral specialist in different parts of the country to whom such cases could be referred and from whom the patients could receive the best operative skill.

It is a matter of impossibility for men who only occasionally see cases of foreign bodies in the bronchial tubes, to keep themselves in that extreme practice which is absolutely necessary for dexterity in the removal of these bodies.

While no laryngologist is willing to allow a foreign body to remain in the bronchial tubes if it is possible to extract it, cases, however, have been reported where the foreign body has remained in situ, either finally producing a localized lung abscess or becoming encysted, remaining in this manner without producing any untoward symptoms.

The present case is reported, not with the idea that there may not be some future trouble, but one of interest in that up

to the present time, two years since the accident, the patient has remained in good health with no symptoms of discomfort.

Miss C. E. D., age twenty-eight years, domestic, gave history of eating puffed rice and in some unknown way sucked into her larynx a small brass head carpet tack. She was immediately seized with a violent spell of coughing and some difficulty in breathing. She consulted Dr. Crawford, who had an X-ray taken, and this plate showed the tack in the right bronchial tube between the seventh and eighth ribs, with the head of the tack pointing down. She was sent to Grady Hospital, and with the assistance of Dr. Crawford and Dr. McDougall I attempted its removal under local anesthesia, using the Brunnings bronchoscope. Our attempts proved unsuccessful, so we decided to allow the irritation to subside, and on the next day passed the bronchoscope through a low tracheotomy incision. We then made use of the fluoroscope and in this way attempted the removal of the foreign body under a most excellent shadow. It seemed as if the foreign body was in one of the branches of the large tube, causing us to be unable to grasp and dislodge the tack. After several attempts we decided to desist from further instrumental manipulations and allow the tracheotomy wound to heal, leaving the foreign body in situ for fear of more damage than the presence of the tack itself. Patient experienced no further trouble and remained comfortable. No temperature, cough, or expectoration after the first few days. Patient then continued her work without interruption. On November 14th, five months later, at a meeting of the Southern Medical Association, our Fellow, Dr. R. C. Lynch, undertook again the removal of the tack. The X-ray showed that it was in the same position. Under general anesthesia, Dr. Lynch had no difficulty in passing the bronchoscope, although he found that all the tubes he possessed were too short. He also located the foreign body in one of the side bronchial twigs. Not having the necessary length tubes and being unable to obtain any in our city, the foreign body still remains in the same position as previously shown.

Following this second operation, the patient experienced no difficulty whatever and in a few days was again at her domestic work. I have seen her several times since, now about two

years since the original accident, and she has increased in weight, with every evidence of no discomfort. I show you two X-ray photographs. The first is the one taken at the time of the accident, and the second just a few days ago.

A somewhat hurried research into literature for accounts of foreign bodies in the lungs or bronchi of two or more years' sojourn, brought to light notes of forty-seven cases, or forty-eight, including the personal case. Since continuation of the research failed to discover any further case, the author feels that not many have been overlooked, although to make sure, it would be necessary to read over hundreds of case reports and discussions of papers. The importance of the subject is hardly such as to warrant such an outlay of time and pains.

The age of the patient, the kind of foreign body, the immediate symptoms, and the fate of the patient need not greatly concern us in this particular collection of data, for in the first place they throw no light on the main question of length of sojourn in the chest. As might be expected, the longer the sojourn, the fewer the number of cases. The number of cases in which the sojourn was two years or less than three years was ten. Had we noted the cases of one full year and less than two years, this would have been correspondingly larger. The number of cases of sojourn of three full years and less than four years was six; of four to five years, two cases; five to six years, two cases; six to seven years, three cases; seven to eight years, five cases; eight, nine and ten years, two cases each. These irregularities disappear if we proceed by five year periods. Thus, from two to seven years, the total number was twenty-three cases; from seven to twelve years, the total number was thirteen cases. The number from twelve to seventeen years, exclusive, was four cases, and that from seventeen to twenty-two years, exclusive, was two cases. These figures show plainly that the more remote the period of operation, the fewer the cases.

Gross, in his monograph on foreign bodies in the air passages (1854), could make but two classes of cases, to-wit: Those in which the foreign body was coughed up and those in which it was found at autopsy. Since about 1897 two other classes have been added: those removed by bronchoscopy, and, in theory at least, those recognizable (but not removed) by the

X-ray. A fifth class is also possible—those removed through the chest wall.

Some interest doubtless attaches to the foreign bodies of longest sojourn. The record is held by an old American case—that of Bartlett, reported in 1846, in which a chicken bone, swallowed at the age of three years, was coughed up sixty years later. Chevalier Jackson is second, with a record of twenty-six years' sojourn for a collar button removed with the bronchoscope. The third place is held by the case of Eldredge of Rhode Island, the sojourn being twenty-three years. The case was reported in 1860 and the reference does not mention the nature of the object. The cases of Lescure in the eighteenth century and of Beer of New York in 1916 are tied for fourth place at seventeen years. The former was one of expectorated bone, and the latter one of a paper clip removed with the bronchoscope.

A case of fourteen years' sojourn was reported in 1876 by Reclam, in which the foreign object was a needle. Of more than usual interest was the coincidence in which two Americans, Whitley of Georgia and Woolsey of Tennessee, two years apart, 1878 and 1880, reported almost duplicate cases of a cockle burr coughed up eleven and twelve years, respectively, after aspiration. We omitted to mention in its proper place the case of a pin coughed up after sixteen years. The case was reported in 1886 by Colquhoun of Australia. Another case of long sojourn was reported in 1842 by Carpenter of Guy's Hospital, in which some teeth were found in the lung at autopsy, thirteen years after aspiration. During the present year, Walters of California has reported the removal, with the bronchoscope, of a piece of bone aspirated eleven years before. The longest sojourn in Killian's practice seems to have been a needle, for ten years. Another ten year sojourn is recorded by Dupuytren in connection with a coin. It seems hardly worth while to continue this narration because of the complete want of type. There appears to be no reason why any kind of foreign body cannot sojourn in the lung for any interval.

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BLASTOMYCOSIS OF THE UPPER RESPIRATORY
TRACT, WITH REPORT OF A CASE PRIMARY
IN THE LARYNX.*

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Since the first case of systemic blastomycosis was reported by Busse and Buschke¹ in 1894, there have been published forty-seven cases originating in America. Several summaries of cases have been made, notably Hektoen's² in 1907, and Montgomery and Ormsby's³ in 1908, which include the cases of Busse and Buschke, Curtis and Gilchrist. None of the latter writers mentions involvement of the upper respiratory tract.

In an excellent review of the literature, with a classification of all the cases previously reported and with the addition of five cases of their own, Wade and Bel⁴ have thrown out reports from the other countries, owing to confusion in diagnosis between blastomycosis and infection by other fungi, and in the present discussion it seems best to follow their example and confine ourselves to the consideration of only those cases reported from America, with one exception, to be noted later.

Of these forty-seven cases, six showed lesions somewhere in the upper respiratory tract, either clinically or at necropsy, and in the autopsy report of one other,⁵ is the statement that laryngitis, trachetitis and bronchitis were found, but with no information as to whether these were due to the blastomycetes or were secondary to the specific infection.† Wade and Bel do not include this case as one of laryngeal invasion in their table of "distribution of lesions in the necropsied cases," and with them I shall consider these lesions as secondary ones.

Of these six cases, autopsies showed that the larynx was

*Candidate's thesis.

†Cleary's anatomic diagnosis in this case, so far as the upper respiratory tract is concerned, is "decubitus necrosis of the larynx, mucopurulent laryngitis, tracheitis and bronchitis."

involved in three,⁶ retropharynx in two,⁷ and in another case which was still alive, the disease began with a suppurative tonsillitis,³ lasting thirty-six days, presumably of blastomycotic origin.

To these cases may be added three others by Simoni,⁸ in which blastomycetes were found in tissue removed from cases of tuberculosis vegetans of the nose. No histories of the cases are given, the writer contenting himself with a description of the histologic findings. He was able to demonstrate giant cells and tubercle bacilli as well as blastomycetes in the sections. The material for his study consisted of two tumor-like specimens furnished him by the director of the Anatomical-Pathological Institute of a Milan hospital and of a similar specimen from a case in his own practice. He describes them as being about the size of a bean, of hard consistency, resistant to cutting and of a pink color. The specimen from his own case was removed from the anterior portion of the left inferior turbinate. He was unsuccessful in isolating the blastomycetes. Owing to his failure to give any clinical history whatever of the cases, no idea can be formed as to whether the type of the disease was the same as that reported by others, or whether the fungus was of a similar strain. One gets the impression from reading his article that he rather regarded the presence of the blastomycetes as accidental and of no consequence except as it might have had some modifying effect on the course of the tuberculosis. (It is open to question whether these cases are instances of true blastomycosis.)

Christensen and Hektoen⁹ report a case of blastomycosis involving cutaneous, subcutaneous and muscular tissues in which tubercle bacilli were later found in the sputum, but no blastomycetes were found in it at any time. No autopsy was had in this case except that the skin was examined. This is a case where the two diseases were present in the same individual, but apparently not involving the same tissues.

In none of the reported cases, with the possible exception of Case 15 of Ormsby³ and Simoni's⁸ cases, was the primary manifestation in the upper respiratory tract, this region having become involved later during the course of the general systemic invasion.

According to Stober¹⁰ and others, the resemblance of sys-

temic blastomycosis to tuberculosis is most striking and any case resembling tuberculosis clinically and in which it is not possible to demonstrate the tubercle bacilli, should arouse suspicion and an examination of unstained sputum with the addition of potassium hydrate solution, 1 to 10 per cent, should be made.

The majority of the cases have been found by Chicago observers and have come from the middle western states, although cases have been found in New York, the Atlantic Coast states, in the south, Canada, Colorado and on the Pacific coast.

Only four cases have been found in women; it seems not to be inherited or contagious and, with few exceptions, the victims have been subjected to hard work and exposure and lived in unhygienic surroundings. Dampness predisposes, Stober finding that his cases lived in damp, moldy rooms, often in basements.

The respiratory tract is the atrium of infection in most cases, dissemination from the cutaneous lesions not often occurring.

The blastomyces is the specific cause of the disease. It occurs as a round or oval budding fungus with a double contoured capsule, is frequently found in pus and sputum from the lesions and abundantly in the tissues affected.

Brown and Cummins¹¹ in an exhaustive study of the differentiation between blastomycosis and coccidioidal granuloma, say: "Microscopically both the coccidioides and blastomycetes in animal tissues presented the characteristic endosporulation and budding processes respectively. Neither in the pus nor in the solid tissues at any time, could we demonstrate budding forms in coccidioidal disease nor evidences of ensporulation in blastomycosis."

Histologically the lesions, especially in the respiratory tract, closely resemble tuberculosis. In fact, a number of cases have had an anatomic diagnosis of tuberculosis until a later revision of the findings has revealed the true nature of the malady.

Stober¹⁰ mentions the fact that in the viscera, definite nodules are found which closely resemble tuberculosis and he also says that acute laryngitis and bronchitis were usually associated with active pulmonary lesions and pleural changes.

Practically no tissue in the body is exempt from attack, though the lungs head the list in frequency with a percentage of ninety-six in a total of twenty-seven necropsied cases collected by Wade and Bel.⁴

In the majority of cases the first symptoms are referred to the respiratory tract. It is striking how many of the cases date the origin of their illness from "taking a cold." Following this, various symptoms arise, such as dyspnea, pain in the chest, cough and expectoration of either purulent or bloody sputum. Active hemoptysis is rare. In a few cases the disease has originated from or subsequent to an injury and local and systemic manifestations follow in a short time. Usually an abscess develops at the site of the trauma and fails to heal. More or less rapidly evidences of generalized invasion follow, characterized by malaise, loss of weight and strength, pain, irregular chills and sweats, fever, multiple abscesses, etc.—in short, the signs and symptoms of pyemia. Nephritis, enlarged spleen, leucocytosis and anemia complete the picture and death is from exhaustion.

The duration is from a few months to several years.

Differential Diagnosis: Systemic blastomycosis is most likely to be mistaken for tuberculosis. The fact that the lungs are so frequently involved with cough, dyspnea, purulent, blood-streaked sputum, fever and rapid emaciation explains why this is so. Even localized lesions like the larynx or skin resemble tuberculosis very closely. Hemoptysis and cavity formation are more common in tuberculosis. Examination of the unstained sputum, having in mind the possibility of the presence of blastomycosis, especially in those cases where no tubercle bacilli can be found, will often reveal the presence of the fungus in blastomycosis. Unless complicated by tuberculosis, the tuberculin reaction will be negative. It was so in two of Stober's cases.

As between syphilis and blastomycosis a negative Wassermann test would rule out the former.

Coccidioidal granuloma is a very similar disease to blastomycosis. Confusion in the diagnosis has often arisen. It is said to resemble tuberculosis even more closely than blastomycosis does, is of shorter duration, has a greater tendency to involve lymph nodes, and there are differences in the two

organisms which are distinctive. Thus, in the tissues the reproduction of the blastomyces is by budding, and of the coccidioides by endosporulation. Further, according to Brown and Cummings,¹¹ the initial growth on media of the coccidioides is rapid (twenty-four hours), whereas blastomycetes require ten to fourteen days; the optimum temperature for the former is 37° C., and for the latter, 20° C.

The prognosis is very grave, the mortality being ninety per cent, as stated by Stober.

The treatment is prophylactic, climatic,¹² and large doses of potassium iodid, as much as half an ounce or more daily. Roentgen rays and radium¹³ have been used.

In the case of a localized lesion in an accessible point, thorough and early surgical removal has resulted in cure.

Vaccine therapy was used in one of Stober's cases with curative effect.

CASE REPORT.*

*This case was reported briefly in *Journ. Amer. Med. Assn.*, LXX, 85, by Dr. Downing.

The case I wish to report is, I believe, unique in that, so far as I am informed, it is the only case up to the present time which has originated in the larynx and which in the beginning showed no other signs. Its importance to laryngologists lies in the fact that the diagnosis was distinctly a laryngologic problem. The patient was an inmate of the Modern Woodmen Sanatorium, an institution devoted to the treatment of tuberculosis, which receives most of its patients from the Middle West. He was sent there with a provisional diagnosis of tuberculosis, and since the medical staff could find no evidence of that disease he was referred to me for an opinion on his laryngeal lesion. It is through the courtesy of Drs. Crouch and Downing of the sanatorium staff that I am permitted to make this report. His history is as follows:

Mr. G., age thirty-nine years.

Family History.—Knows nothing about his father. Mother had "kidney trouble," and died suddenly at age of forty-nine years; miscarried once after patient's birth. No brothers or sisters.

Previous History.—Is married and father of six living healthy children. Has lived all his life in the Middle West

and South, working at various employments, mostly in towns. Last residence was in Kansas, where he lived twelve years. Had spinal meningitis, measles, and whooping cough in childhood, pneumonia at seventeen; has had gonorrhea; "rheumatism" four years ago. Uses tobacco but no alcohol.

Present Illness.—Was working in the summer of 1916 in a grain elevator, where there was a great deal of dust. In August had severe tonsillitis, which was treated with iodine. This got better until he was sent to work cleaning out the "dump" or pit of the elevator, when he got much worse, and the trouble settled in the larynx. This "dump" contained old decayed wheat, rotten wood and rat manure, had not been cleaned before in years and was very dusty and moldy. Coughed and sneezed continually, and finally became hoarse and had pain in the throat. Lost strength and was forced to give up work on October 5th. Admitted to the sanatorium on November 10th, where the following notes were made:

"Pain in ear, no expectoration, strength good, digestion and appetite good, average weight last three years, one hundred and twenty-five pounds. Highest weight, one hundred and thirty-five pounds. Now weighs one hundred and nine pounds. Had abscess in forearm July, 1916; coughs; has pyorrhea; palpable cervical glands; eczema lower third of the left leg."

Chest Examination by Dr. Crouch.—Has a few fine râles and roughened breath sounds right apex in back. Chest findings not well marked. X-ray shows lungs clear.

Blood Pressure.—S., 120; D., 80.

Temperature normal.

No tubercle bacilli in sputum after repeated examinations.

When seen by me on November 16, 1916, he revealed an infiltrated and ulcerated area involving the epiglottis and median glossoepiglottic ligament, both arytenoid regions and false cords. Nothing of note in pharynx.

Nose.—Marked irregular deviation of septum obstructing left side.

A piece of the infiltrated tissue of the epiglottis was removed by me and sectioned by Dr. Downing, who reports as follows: "Section from piece of epiglottis shows epithelium eroded in places by collections of small cells in which are many double contoured, some budding, blastomycetes. Many

large giant cells. Diagnosis: Blastomycosis of epiglottis and larynx."

On November 28, Dr. Downing found a few blastomycetes in a smear from the ulcer on the epiglottis.

Wassermann was negative in two examinations.

Temperature has varied between 98 and 99 degrees, once or twice going a few tenths above 99°.

The patient was at once put on potassium iodid in increasing doses, and X-rays were applied to outside of the larynx at weekly intervals. After a few weeks' treatment his general appearance improved and he gained eight or ten pounds. The infiltration in the larynx diminished so that his cords could be seen, which were invisible at the first examination.

Owing to his intolerance of iodids the patient was not able to take adequate doses, and that part of his treatment had to be frequently interrupted. As a result, he began to lose ground and the infiltration in his throat to spread so that, owing to increasing stenosis, it was necessary to do a tracheotomy on February 21st. Another X-ray taken a few days later shows distinct trouble in his lungs.

This case apparently had at first no other lesion except that in the throat. While it is possible he may have had involvement of the lungs also, the chest and X-ray findings were so meager as to make this extremely doubtful. The history seems clear that he received his primary infection in the larynx from breathing the contaminated air from the dusty, moldy pit in which he worked, and that the lungs became secondarily involved. The patient returned to his home. Death occurred in October, 1917. No autopsy was permitted.

In none of the cases reported in which the upper respiratory tract was involved, with the exception of Ormsby's case,³ did the disease originate in this region. In this case it apparently began with a suppurative tonsillitis lasting thirty-six days and terminating in pneumonia, which confined him to his bed for seven weeks, following which he had cough and moderate expectoration. Shortly after this, blastomycotic lesions developed in various parts of his body. At the time of the report this man was at death's door. It is of course impossible to say whether the original tonsillitis was or was not of blastomycotic origin. At best, one can only assume that it was be-

cause of its unusual duration and the subsequent development of blastomycotic lesions elsewhere in the body. In the case I report there can be no doubt of the primary lesion being in the larynx and that this lesion is due to infection by blastomycetes. It is probably only a coincidence that my own case also began with a tonsillitis which, however, was apparently merely of the usual sort and had no special characteristics. Furthermore, in Ormsby's very detailed report of his case, which covers a period of almost two and a half years, no further mention is made of any trouble in the throat. It is probable that had the original tonsillitis been of blastomycotic origin, complete healing would not have occurred but that regional extension would have supervened.

In Hill and Dickson's case¹⁴ the disease lasted one year, beginning with a cold, and on admission to the hospital, six months later, the infection was generalized; but with no symptoms particularly referable to the upper respiratory tract except a slight cough. Autopsy report showed larynx involved by a number of small shallow ulcers along the margin of the right vocal cord, and "when pressure is exerted over the outer surface of the thyroid cartilage, pus exudes through these ulcers into the larynx."

Cleary's case⁵ began with a cold several months before admission to the hospital; for ten days before admission had been hoarse. Shortly before death, which occurred in nine days, complained of sore throat and pain in the right chest and was aphonic. At autopsy a decubitus necrosis of the larynx was found, and Cleary concludes his report as follows: "and in our case, although not examined microscopically, the ulceration opposite the cricoid cartilage corresponded in all its gross appearances and location with the decubital necrosis in this region." He regards the lungs as the first organ affected.

Ormsby and Miller's case⁶ is very interesting, owing to its resemblance to tuberculosis. The patient was not strong for ten years. Six months before admission to the hospital caught cold, which settled on his chest, coughed and expectorated blood-streaked sputum. Soon had symptoms of laryngitis with complete aphonia, but no pain, and ulcers were found in the larynx. "These ulcers differed in appearance and location from those of tuberculosis, being circular with smooth bor-

ders, not presenting a worm-eaten appearance." "There were four on the epiglottis, one each on the left aryepiglottidean fold, the left ventricular band and the right true vocal cord." Tuberculin test negative. The postmortem examination revealed enormous numbers of blastomycetes in all the preparations from the lungs, liver, etc., and also from the ulcers in the larynx and trachea. No tubercle bacilli were found in any of the sections.

In Irons and Graham's case⁶ there were no symptoms referable to the upper respiratory tract during life, but autopsy by Le Count showed, "in the covering of the thyroid cartilage on the right side there is a small cavity containing purulent material. The cartilage below appears to be normal. The larynx and trachea show no changes. No tubercle bacilli could be demonstrated. This is not, strictly speaking, a case involving the larynx but only the tissues covering it."

In the report of the case of Eisendrath and Ormsby,⁷ no reference is made to any clinical signs of a retropharyngeal abscess, but Le Count and Myers¹⁵ in their final report of this case found a large retropharyngeal abscess. The first symptoms in this case were pulmonary, and blastomycetes were found in the sputum.

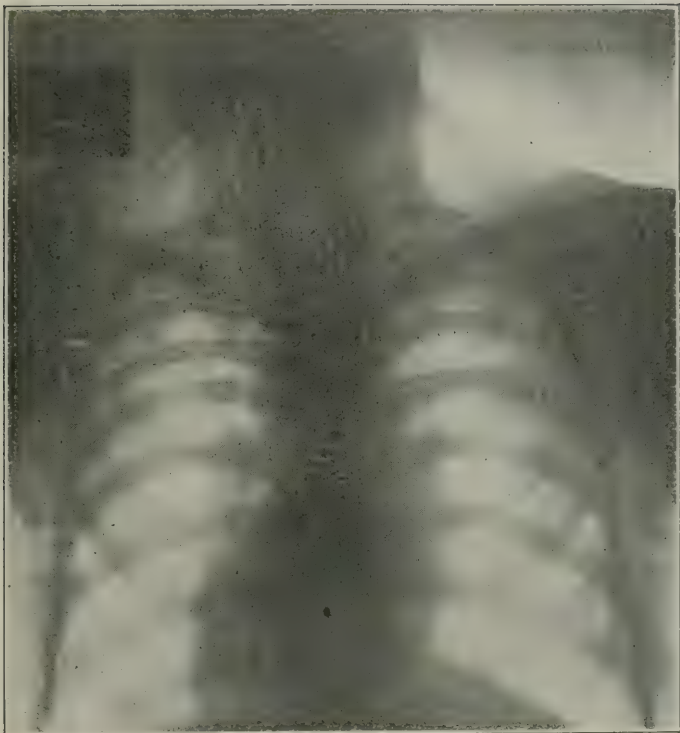
The case of Washburn¹⁶ is an example of blastomycosis following trauma. The lesion began following injury to the elbow, and three months later there were hoarseness, cough and expectoration, which increased after one month, and the patient lost weight rapidly. Later a retropharyngeal abscess was evacuated, the pus from which revealed blastomycetes in large numbers. Repeated examinations of the sputum for tubercle bacilli and blastomycetes were negative.

Autopsy was confined to the chest and abdomen. No examination of the larynx or retropharynx was made. Blastomycotic lesions were found in the lungs, spleen and liver resembling miliary tuberculosis.

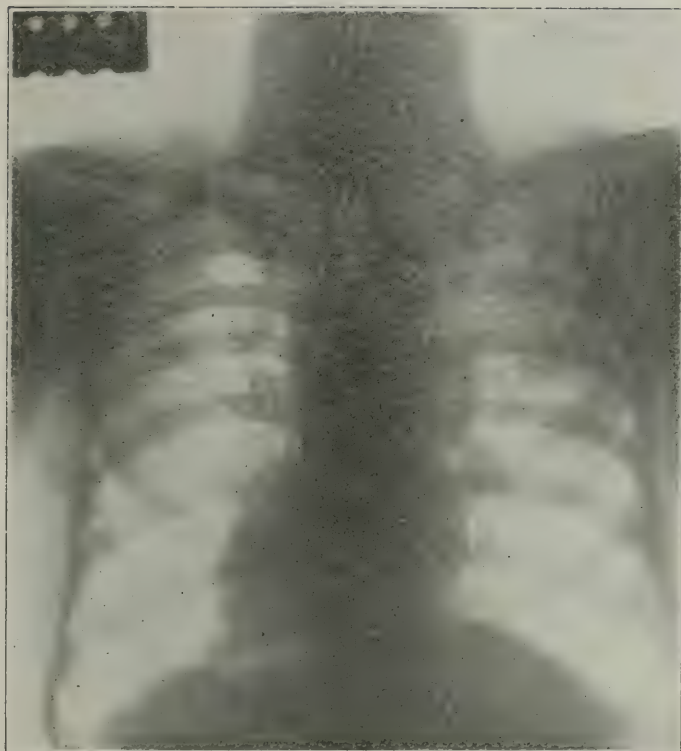
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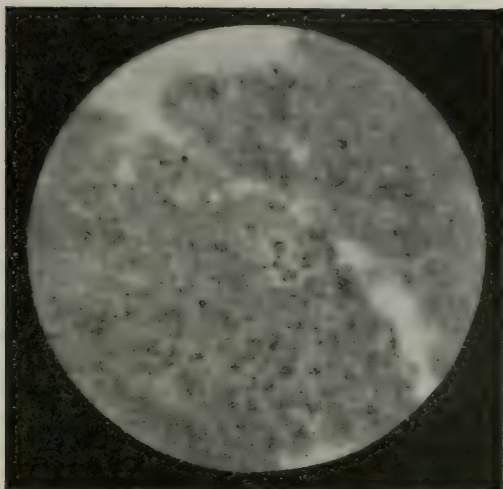
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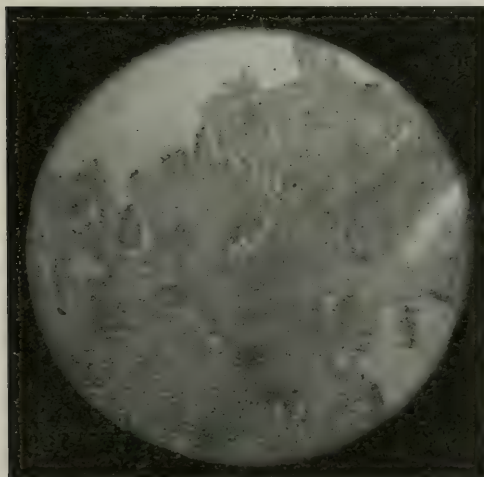
Case of blastomycosis of the upper respiratory tract.
Taken December 20, 1916.



Case of blastomycosis of the upper respiratory tract.
Taken March 12, 1917.



Case of blastomycosis of upper respiratory tract.
Section of epiglottis. X475.



Case of blastomycosis of upper respiratory tract.
Section of epiglottis. X45.

REPORT OF A CASE OF GRANULOMA OF THE MASTOID SIMULATING SUBPERIOSTEAL ABSCESS.

BY JOHN D. RICHARDS, M. D.

The patient, a child under one year of age, had, six weeks prior to coming under observation, a slight discharge from the ear, which ceased in a few days. The ear was not seen by a physician at that time, as the condition subsided, and the patient took no further note of it. A few days before I was called to see the child there had appeared a marked swelling behind the ear.

Upon examination, the following condition was found: The auditory meatus was collapsed and it was impossible to see the drum. There was no free discharge present in the canal. The auricle was protruded forward, as in subperiosteal abscess, and the postaural swelling was, to all appearances, that of an ordinary subperiosteal abscess without the inflammatory condition of the scalp. Fluctuation was present.

Upon operating, the incision—instead of opening into a cavity filled with pus—revealed a grayish yellow tumor occupying the site of the mastoid and completely filling it. Upon removing the main mass, it was seen that the tumor had as its base the dura of the temporosphenoidal and cerebellar lobes, the dural plates having been completely destroyed through pressure erosion; it was due to this that the impression of fluctuation was given when the postaural swelling was palpated. The vertical limb of the sigmoid sinus was obliterated, and the tumor mass was attached to the dura of both brain lobes. There was no posterior bony canal wall to the meatus; the middle ear cavity was packed with the mass. The capsule of the joint of the jaw was exposed through erosion of the anterior wall of the bony meatus, which had largely disappeared. The tumor had broken through the mastoid tip, so that there was a considerable portion of it infiltrating the tissues of the neck in the region of the digastric muscle.

At the time of operation the case was regarded as being

one of sarcoma, in which no attempt should be made to remove it other than to curette out roughly such portions as would temporarily relieve pressure. This was done. No attempt was made to create a meatal flap. The wound was sutured almost completely, only a small opening being left for the insertion of a wick for drainage.

The laboratory reported the tumor to be a round cell sarcoma, and an unfavorable prognosis was given. At the expiration of ten days the local condition of the wound was suspiciously good. About this time I received a report from Dr. Jonathan Wright, in charge of the hospital laboratory, to the effect that upon personally examining a number of sections of the tumor it was his opinion that the tumor was not sarcoma but was composed of granulation tissue only.

The recovery of the case was exceedingly rapid. There was little discharge from the cavity at any time, and the wound would probably have healed by primary union had it been completely closed. Two years later the child was seen again, in perfect health, though there was an atresia of the membranous meatus.

XXXVII.

REPORT OF A CASE OF MASTOIDECTOMY FOR ACUTE SUPPURATIVE OTITIS MEDIA, FOL- LOWED LATER BY FACIAL PARALYSIS, ALMOST TOTAL DEAFNESS, MENIN- GITIS AND DEATH.

BY JOHN RANDOLPH PAGE, M. D.,

NEW YORK.

In this case, the brief report of which follows, a facial paralysis began to develop three days after a simple mastoid operation, and in two days it was complete. Seven days after the operation there occurred suddenly, with vomiting and tinnitus, but apparently without nystagmus or vertigo, total loss of hearing in the opposite ear, and it was then noticed positively for the first time that there was almost total loss of hearing on the operated side. A high leucocyte count and cloudy cerebrospinal fluid were present, with a mental condition that remained unimpaired almost to the last day.

A delicate boy, ten years old, had a simple mastoid operation performed on his right ear in May, 1916, from which he made a good recovery. He was unusually bright and sensitive, and not robust, though he had improved in health during the past two years. On the twenty-sixth day of January, 1918, eight days after the development of an abscess in his left ear, he was seen by the writer for the first time since the operation two years before. At this examination his temperature was 103 by mouth, and he complained of severe headache. His mastoid was acutely tender, with a profuse characteristic discharge from the middle ear and marked sagging of the posterosuperior canal wall. Immediate operation was advised and consented to.

A thin darkened cortex was removed with a rongeur, and a pneumatic mastoid was found filled with pus, a culture from which showed hemolytic streptococcus. The cells were involved behind and internal to the facial nerve, but no exposure

of the nerve was made. What appeared to be healthy dura was exposed in the region of the attic and antrum, and the sinus was exposed over its vertical limb. The exposed sinus wall on the seventh day after the operation, when the temperature rose to 104, still had no granulations over its lower part and it looked as if infection might be passing through it, but in the next day or two it showed a healthy appearance, and the blood culture was negative.

The patient was comparatively comfortable the day after the operation, though his temperature at 9 a. m. was 103 by rectum. During the next eight days the bedside notes are of interest, showing what may have been an invasion of the meninges along the left facial nerve, with little or no disturbance of the static labyrinth, and the gradual development of a basilar meningitis, which caused total loss of hearing in the opposite ear and death a few days later without impairing the mental condition of the patient until almost the very end.

January 28th, second day after operation. Temperature ranged between 100 and 101. Patient felt nauseated and vomited small amount of clear fluid. Urine showed presence of acetone and diacetic acid. Bicarbonate of soda and ice water was administered by mouth and bicarbonate of soda and glucose by rectum. Vomiting ceased.

January 29th. Temperature ranged from 98.6 to 100.2. Rested comfortably. Full dressing was done under nitrous oxid anesthesia. A slight paresis of the muscles of the left side of the face was noticed. Acetone and diacetic acid was no longer present in the urine. Patient cheerful. No evidence of vertigo or labyrinthine disturbance.

January 30th. Temperature ranged from 99.2 to 101. Fairly comfortable morning. Later complained of headache. Paresis of facial muscles increased. Wound showed considerable purulent discharge. Dakin's solution was instilled in the wound through a tube every two hours. Sat up in bed.

January 31st, fifth day after operation. Secretion in wound less. Dakin's solution discontinued. Temperature ranged between 98.2 and 100.6. Comfortable day. Slight headache at night. Facial paralysis practically complete.

February 1st, sixth day after operation. Temperature ranged from 98.2 to 101.2. Vomited slightly at 8 a. m. and

complained of slight headache. Had fairly comfortable day, however, and retained his nourishment.

February 2d, seventh day after operation. Complained of slight headache during the night. Temperature at 6 a. m. was 102.6. Vomited at 6:30 a. m. Vomited small amount of greenish fluid at 7:30. Up to this time there was apparently no difficulty in hearing. At 9 o'clock he vomited clear fluid. At 10:45 he was visited by me and was found sitting up in bed. As soon as I entered the door he called out in a loud voice, "Good morning, doctor," and shouted that he had a roaring in his right ear and could hear nothing. It was apparent that he could not hear the sound of his own voice. The nurse was asked how long he had been deaf, and she replied that she had only just noticed it, that he had been able to hear her well a short time before. A blood count was taken that morning which showed 42,000 leucocytes and 90 per cent polynuclear neutrophils. Blood culture taken at the same time was negative, urine was normal and eye grounds were normal. Mental condition was bright. Dr. Duel and Dr. Mixsell were in consultation. Lumbar puncture was done by Dr. Dwyer at about 3:30 in the afternoon, when the temperature was 103.8. The cerebrospinal fluid was cloudy, but no bacteria were found on smear or culture. Lactic acid was present and sugar was present. There was pain in the back of his neck and between his shoulders, but there was no marked rigidity or very evident Kernig sign. Headache was intense in the morning, but after lumbar puncture patient slept well and said he felt better and had hardly any headache. The temperature was 104 and pulse 90 at night. Condition was improved except for the high temperature. There was no further record of vomiting until the afternoon of the following day.

February 3d, eighth day after operation. Temperature ranged between 101.2 and 103.8. Pulse from 84 to 104. Blood count, 44,000 leucocytes and 89 per cent polynuclear neutrophils. Eye grounds were examined and found normal. During the dressing the patient remarked that his hearing was much better when the dressing was off the right ear. In the afternoon vomiting and headache returned. At 1:30 a. m. he complained for the first time of feeling dizzy and vomited immediately a small amount of dark fluid. During the night

he asked for some cherries and was allowed several which he retained. There was no apparent change in his mental condition, but in voiding urine he seemed unable to sit up as usual. He slept quietly all night and some of the time turned on his affected side.

February 4th, ninth day after operation. At 6 a. m. his temperature was 103. He retained some orange juice. At 7 a. m. he complained of being hungry and ate a little cereal and milk. At 9 a. m. he had a temperature of 103 and complained of shooting pains in his forehead and later pains in his head and spine between the shoulders. At noon his temperature was 103.8 and he was very thirsty. At 1:30 he vomited a large amount of undigested milk. At 2 p. m. he voided urine in bed. An hour later he became noisy and screamed with pain. He was quite rational. His temperature in the afternoon was 103.6; blood count, 47,600 leucocytes and 88 per cent polynuclear neutrophils. At 6 p. m. he was quiet and rational. Vomited small amount of clear fluid. During the night he vomited several times, complained of intense thirst and was irrational at times.

February 5th, tenth day after operation. Patient had typical meningeal cry. Rational only at times in the morning. Temperature dropped from 104 at 6 a. m. to 100.2 at 3 p. m., and at 6 p. m., two hours before his death, temperature was 104.4.

No autopsy was obtained.

From the second day after the operation until two days before his death the patient frequently sat up in bed and showed no loss of equilibrium. While until the last there remained a slight amount of hearing in the left ear, it was only for very loud sounds, and words could not be distinguished except on one or two occasions when the dressing was off. There was sudden and total loss of hearing in the right ear.

An interesting point to decide is, whether this was a labyrinthine deafness or a retrolabyrinthine nerve deafness. The sudden loss of hearing with roaring tinnitus and vomiting leads one to think first of the labyrinth, but when it is recalled that from first to last the patient was at all times able to sit up without disturbance of equilibrium it seems improbable that any destruction of the labyrinth could have taken place. For while a simultaneous obliteration of both laby-

rinths might occur to cause total deafness without nystagmus, such sudden destruction would necessarily be accompanied by some very evident disturbance of equilibrium.

The conclusion reached is that meningitis was the cause of the persistent vomiting and deafness, and not disturbance of the labyrinth, and that invasion of the meninges very likely took place in this instance along the route of the facial nerve.

127 East 62nd Street.

REPORT OF SOME INTERESTING CASES OF
VINCENT'S ANGINA.*

BY CLEMENT F. THEISEN, M. D.

There have been a considerable number of papers on Vincent's angina published during the past few years, and much has been accomplished in the way of treatment.

It is, of course, an accepted fact that the fusiform bacillus, with the spirillum or spirochete, are always found in the throat swabs in cases of Vincent's angina, and together with other characteristic clinical findings make the diagnosis positive. The organism causes a pseudomembranous ulceration of the throat and other parts of the fauces, being sometimes confined to the tonsils, but in the severe cases often involving practically the entire fauces and other parts of the mouth.

This bacillus is, however, not the specific organism of Vincent's angina alone, but is found in mastoiditis, hospital gangrene, bronchopneumonia, diphtheria, throat syphilis and stomatitis. Cultures and smears usually show mixed infections with other organisms, mainly the pneumococcus, Klebs-Loeffler and staphylococcus.

The ulceration of Vincent's is frequently mistaken for the ulceration of syphilis or diphtheria, perhaps because only the cultures were examined and not smears as well.

The organism flourishes in unhealthy mouths, particularly around decayed teeth and diseased tonsils. In the writer's experience the infection usually starts around a bad molar tooth and spreads from there to the tonsil and other surrounding parts.

Halsted, in his very complete paper (Trans. A. L. A., 1912), states that there are two distinct clinical types of the disease, the one form to be differentiated from diphtheria and other nondiphtheritic pseudomembranous anginas, while in the other

*Read before the American Laryngological Association, May 27, 1918.

form localized ulceration simulating syphilis very closely is present.

In the writer's experience, the second type mentioned by Halsted occurs almost exclusively in adults, while almost all authors agree that the first type, simulating diphtheria and other membranous conditions, particularly those in which the streptococcus predominates, is far more frequent in young people. In practically every case of the ulcerative type the writer has found carious molar teeth with unhealthy gums—in fact, in nearly all adult cases the disease develops in mouths that are not well cared for. The odor is distinctive and characteristic, and in many cases the diagnosis can be made on that alone. In the cases that are not promptly treated and go on to extensive ulceration of the fauces, it is in fact almost unbearable. The fact that the type of the disease in children so closely resembles diphtheria accounts for many of the mistakes in diagnosis.

In the Michigan State Laboratory in 1909-10, out of six hundred and eighty-seven throat swabs sent in to be examined for diphtheria, one hundred and seventy-eight were not cases of diphtheria at all, but proved to be Vincent's angina. A clinical diagnosis of diphtheria had been made in two hundred and twenty-four of the six hundred and eighty-seven cases, but the bacteriologic diagnosis proved that only one hundred and twenty were true diphtheria cases.

Forty-six of the cases clinically diagnosed as diphtheria proved to be Vincent's angina.

Rolleston (Br. Journal Children's Dis., Vol. VII, 1910) states that of 18,187 cases of suspected diphtheria admitted to the Metropolitan Asylums' Board Hospital (London) from 1905 to 1907, 3,047 were found not to be diphtheria; of this number, 95 were cases of Vincent's angina.

Vincent himself found the disease in two per cent of all cases of membranous anginas.

Lubowitz found the specific organism in six out of thirty-eight cases of ulcerative stomatitis.

Rodella found them in about one-third of all the pseudo-membranous anginas he examined.

Cases of bronchitis have been reported by Rothwell (Jour.

Amer. Med. Asso., Vol. LIV, 1910), in which the main organism found was the fusiform bacillus.

Fatal cases are not as uncommon as is generally believed, and in children, some cases in which a diagnosis of laryngeal diphtheria had been made terminating fatally, and in which the Klebs-Loeffler bacillus was not found, were undoubtedly cases of Vincent's involving the larynx. The writer has seen cases of the ulcerative type involving both the pharynx and the larynx. These cases are always serious, and in children, when a pseudomembrane is also present in the larynx, are sometimes fatal.

Three fatal cases have been reported by Bruce, and others by Meyer and Halsted.

Halsted's case was particularly interesting. A young woman, aged thirty-three years, was sent to the hospital in a semi-conscious condition. The gums and mucous surfaces of the lips were covered with a thin membranous exudate, which later developed into an ulceration. The autopsy showed a chronic interstitial nephritis, endocarditis of the mitral valve, a bilateral chronic salpingitis, and ulceration of the mouth, larynx, trachea and esophagus. A bacteriologic diagnosis of Vincent's angina was made before death.

The writer would like to add two fatal cases to the above list. One has already been reported (Trans. Amer. Laryngol. Asso., 1912, p. 228). This patient, a tramp, about whom we could find out nothing, was brought to the hospital in a semi-conscious condition. His throat showed the worst ulcerative condition I have ever seen. The tonsils, uvula and part of the soft palate were practically destroyed, and there were deep ulcerations on the gums and mucous surfaces of the cheeks. Smears from swabs showed the specific organisms. He lived only a few days after being brought to the hospital, never becoming fully conscious. He received salvarsan intravenously and local treatment, without any result whatever. Just before death he developed hemorrhages from the nose, throat and rectum. Autopsy showed an ulcerative condition in the larynx as well, and a markedly enlarged spleen. On account of the great difficulty in examining his throat, the laryngeal involvement was not discovered during life.

The other case was seen recently and is quite similar to the one just reported.

The patient, a man, aged thirty-two years, came to my office complaining of a sore throat. I was at once struck with the extremely offensive odor when he came near me. The throat condition was almost as bad as in the last case. The uvula and part of the soft palate had been practically destroyed, and there was deep ulceration of both tonsillar surfaces and of the gums around the last molars. The ulcerated surfaces were covered with a tenacious pseudomembrane. The molar teeth were badly decayed and the gums bled easily when touched with a probe. The odor was so bad that it required a good deal of courage to examine him. He said the condition had been going on for several weeks, and he had received no treatment. He had been using a mouth wash of peroxid and water.

He was in an extremely weakened condition, because the pain in swallowing was so severe that he had not been able to take much nourishment. No history of syphilis could be obtained. Smears from throat swabs verified the diagnosis of Vincent's. I started him at once on a line of treatment that I have found effective—i. e., a strong solution of pot. chlorate, powdered alum, carbolic acid, glycerin and water, to be used as a gargle, and locally the ulcerated surfaces, after cleaning, were swabbed with a saturated solution of methylene blue in alcohol. He was given K. I. in large doses. This is always administered in the writer's cases, whether a history of syphilis is obtained or not. Blood count showed a moderate leucocytosis. He failed steadily in spite of all our efforts and died about two weeks after I saw him. The larynx was not involved in this case. I forgot to mention that salvarsan was used both locally and intravenously without any appreciable effect. We did not succeed in getting an autopsy.

I wish also to report two cases, fortunately not fatal ones, in babies aged fourteen and eighteen months. I have never before seen the disease in children as young as this, although we learn from the literature on the subject that it occurs at all ages.

As these two cases were practically identical clinically, although occurring in different families, I will report them

together. In both, the first indication that there was anything wrong was the refusal to take nourishment. The throat findings in both cases were similar. Both children had moderately large tonsils covered with a pseudomembrane, in appearance very much like a diphtheritic membrane. This could be fairly easily removed, and underneath, the surfaces of the tonsils were covered with a superficial ulceration. One of the unusual features of both cases was the extensive involvement of the glands of the neck. There is often some adenitis, but in these cases the cervical glands were very large and tender to the touch. There was a trace of albumen in the urine, which is, of course, a fairly common thing in all anginas. There was very little temperature. Throat cultures were taken and examined for both diphtheria and Vincent's. A clinical diagnosis of Vincent's had been made, mainly on account of the typical odor, which we find in all cases. No Klebs-Loeffler bacilli were found, but numerous fusiform bacilli and some streptococci. A spray of potassium chlorate, powdered alum, carbolic acid, glycerin and water was used, and in five days, with this treatment alone, the throats in both cases were entirely clear. Throat swabs were again examined at this time and no Vincent's organisms found. This combination of old drugs, in spray form, for children too young to use gargles, and as a gargle for older children and adults, is extremely valuable for the mild cases. The strength of the solution varies, of course, according to the age of the patient.

The cases just reported are the type that clinically resemble diphtheria more closely than the other forms of Vincent's.

TREATMENT.

The good results following the use of arsenic in some form are so well known now that it is only necessary to mention that salvarsan, used locally or intravenously, is very valuable in the severe cases. Hubbard, in a recent article, speaks of the value of iodoglycerole, very much like the old glyceride of iodine recommended by Mayer and others in the treatment of this disease. I have used the solution but have not found it as effective as some other local measures, such as a saturated solution of methylene blue in alcohol (also advocated by Sluder). I have always thought that the alcohol does as much good as the anilin dyes, and, as a matter of fact, experiments

have shown that a twenty per cent solution of alcohol will kill practically all throat organisms.

Hubbard, in the paper before mentioned (*Trans. Amer. Laryngol. Asso.*, 1917), also mentions the value of cacodylate of sodium. Another one of the arsenic group, enesol, an arsenate of mercury, used hypodermically, has been highly recommended by Halsted. The writer has had no experience with this preparation. Its action is probably very much like that of salvarsan, which is certainly valuable, particularly if followed by iodid of potash in increasing doses. Locally, I have found a solution of potassium chlorate, powdered alum, carbolic acid, glycerin and water to be one of the most effective methods of treatment. Pure alcohol swabbed on the ulcerated surfaces is also extremely valuable. I have found the greatest difficulty in having the severe cases get enough nourishment, because the pain in swallowing is often so great. A solution of orthoform in olive oil, swabbed on the ulcerated surfaces before meals, affords a certain amount of relief. A spray of carbolic cocain, in the worst cases, gives more relief than anything else, if used a few minutes before meals. In some of the adult cases of the ulcerative type, we are probably dealing with a combination of syphilis and Vincent's, even when we fail to obtain a history of syphilis. That may be one reason why salvarsan acts so promptly in some cases, although the concensus of opinion would seem to prove that the arsenic preparations do have a specific action. I have seen cases of this kind in which there was a positive Wassermann (with no syphilitic history), with the typical clinical and microscopic evidence of Vincent's.

FURTHER OBSERVATIONS ON THE RADICAL
TREATMENT OF PERITONSILLAR ABSCESS.

BY CLEMENT F. THEISEN, M. D.,

ALBANY.

In a paper giving the report of an epidemic of acute infection of the throat with abscess formation (Trans. A. L. A., 1916), the writer reported forty-four cases of peritonsillar abscess occurring in that epidemic. In fourteen of these cases, after a dissection backward toward the capsule of the tonsil, to locate the pus, the upper lobe, which had been loosened by the dissection, was removed. This leaves a large opening for drainage, and the cases so operated upon cleared up much more quickly than when simply the usual incision was made.

Ballenger, I believe, was one of the first to suggest a dissection backward toward the capsule in cases of peritonsillar abscess. The pus is present very soon after the attack begins in the majority of the cases, and we often fail to reach it early in the case, because we do not cut deeply enough toward the capsule. Atypical cases with very little pus and great swelling, edema and inflammation of the surrounding parts, presenting the clinical picture of a typical peritonsillar infection, occur, but they are fairly exceptional cases. In the vast majority of the cases the pus is present, but sometimes difficult to locate when it is confined between the body of the tonsil and the superior constrictor muscle. It is in this class of cases, particularly, that Barnes, in his paper on the radical treatment of peritonsillar abscess, recommends dissecting out the tonsil early during the acute stage. He has reported excellent results in a number of cases.

We frequently see cases so late that, owing to the great edema and inability of the patient to separate the teeth, it is difficult to find the usual anatomic landmarks.

In this class of cases the writer has not attempted the removal of any part of the tonsil during the acute stage. When the infection has gone so far as this, the pus is reached with-

out difficulty almost anywhere in the peritonsillar region.

Since the paper above referred to was published the writer has used the method described at that time—i. e., the removal of part of the tonsil after reaching the pus, in twenty cases, and the complete removal in sixteen. These were all suitable cases, seen early, before there was much swelling and difficulty in opening the mouth. The majority of the cases occurred in adults, and this is, of course, the rule in most peritonsillar abscesses. They do occur, however, and not so very infrequently, in children.

In the series of cases reported in my paper in 1916, forty-four in all, four occurred in young children.

Five of the thirty-six cases, reported in the paper read today, occurred in children, and were operated upon under ethyl chloride anesthesia. They were all very nervous children, and could not have been easily managed under local anesthesia. All the adult cases were operated upon with cocain and adrenalin. When possible, I think it is safer to use local anesthetics in these cases, particularly when there is considerable edema filling up part of the throat. I have found, and that is probably the experience of most of us, that as soon as the mouth gag is inserted, after the patient is practically under the anesthetic, he begins to act badly. The same is true to even a greater extent of cases of retropharyngeal abscess in young children.

Barnes, in the paper before referred to (Trans. A. L. A., 1915), speaks of the danger of pulmonary infection from inspired pus, when a general anesthetic is used. He has performed a complete tonsillectomy in his cases on about the third day, and has had no complications of this kind. His cases all got along very well indeed, with no more distress than when the tonsil is removed under normal conditions. He has not found, when care is taken in dissecting out the tonsil with as little bleeding as possible, that there was any spread of the infection. The possibility of the aspiration of pus is of course largely done away with when local anesthetics are used.

The operation the writer has performed in selected cases, when the edema of the surrounding parts is not too great, is as before stated, a capsular dissection of the tonsil backward

until the pus is reached, and then the immediate removal of the part of the tonsil that had been loosened by the dissection.

There is no reason why the entire tonsil should not be taken out at the time, and this was done in my last sixteen cases. There is surprisingly little discomfort after the operation, and the relief following the much more thorough drainage than is afforded by the ordinary incisions is much greater and more prompt. I have not found that this operation, performed during the acute stage, is attended by any increased risk of a spread of the infection, particularly if care is taken to perform the operation with as little bleeding as possible.

The ordinary incision is often attended with much more bleeding and cannot be as readily controlled. When we bear in mind that in a peritonsillar abscess we are really dealing with an infection which soon involves the entire sinus tonsillaris, the risk of causing a more extensive septic process by our operative procedures need not be considered very seriously. Even if this were not so, the great relief following the operation so promptly is well worth the slight risk.

The ordinary incision, unless it is very free, closes very easily, and has to be kept open by packing or by stretching with a forceps every day. Patients as a rule object to this very much more than to the more radical operations, at least that has been the writer's experience. The abscess cavity, unless it is very superficial, drains badly after the ordinary incision, and not infrequently further abscesses form after the patient is apparently well. A tonsil is never perfectly normal after a peritonsillar infection, and in many cases the so-called "quinsy habit" is established, with an attack once or twice a year. The tonsils must eventually come out, and their removal, in selected cases, as early as possible during the acute attack is a rational operation.

I will not report any individual cases, but would like briefly to report a case that really brought home to me the necessity of some more radical operation, in peritonsillar infections, than the simple incision, and started the method of treatment I have used since that time.

A young woman, aged twenty-five years, developed what appeared to be a slight tonsillitis, not follicular, with very moderate inflammation of particularly one tonsil. I gave her

an astringent gargle, told her to use ice, and did not expect to see her again. On the following day she appeared at my office again, stating that she had great pain in swallowing and was feeling much worse generally. The inflammatory process was now confined to the left tonsil, with very little swelling, nothing to suggest a peritonsillar infection. Her distress was so out of proportion to the findings that I decided to make an incision in the usual place. I did not strike any pus. This was repeated every day, punctures and incisions being made in different places, for four or five days, and no pus was found. The patient was getting more discouraged all the time, and I did not blame her. She could swallow nothing but liquids, with great difficulty. During all this time the swelling increased only very slightly, and clinically the condition could not have been called at all typical of a quinsy.

I was about on the point of advising the patient to get another doctor, when it occurred to me that she probably had a deep collection of pus, a very small abscess cavity. I then grasped the tonsil with a forceps and carried my incision directly back toward the capsule, and entered a very small abscess cavity containing very little pus. The dissection was completed and the upper half of the tonsil removed, and in a few days we were both happy.

I suppose we have all had this same experience many times, and do not reach the pus the first time simply because we do not go back far enough toward the capsule. I am speaking now only of atypical cases, such as the one reported, and cases in which we fail to reach the pus during the first few days after the onset of the infection.

CONCLUSIONS.

The radical method of treatment for the quick relief of the distressing symptoms was used in thirty-six selected cases, in twenty of which the part of the tonsil that had been loosened by the dissection in reaching the pus was removed at the time. In sixteen cases a complete tonsillectomy was immediately performed after the pus was evacuated.

The operation is performed as early as possible, usually within two or three days after the onset of the attack, and in selected cases. In cases in which there is so much edema of

the parts that the anatomic landmarks cannot be easily determined the radical method was not attempted.

In this type of cases the inability to separate the teeth is usually so great that the radical operation would be very difficult. Local anesthesia, because of the possibility of the aspiration of pus under general anesthesia, is always used except in young children.

The risk of a spread of the infection is so slight, and has never been experienced by the writer, that there is no reason why a complete tonsillectomy should not be performed in every suitable case, at the time the abscess cavity is opened.

The cases reported in this paper were all unilateral abscesses, but the writer has used the same method in bilateral cases, which are fortunately not as common.

No unfavorable symptoms occurred when both tonsils were operated upon. As a matter of fact, the pain in swallowing after the operation does not last much longer, and the case runs about the same postoperative course as when the tonsils are removed under normal conditions. There is at times some temperature, particularly in children, and the tonsillar fossæ get back to normal conditions rather slowly.

XL.

SYPHILITIC NECROSIS OF THE INTERMAXILLARY BONE.*

BY LIEUT.-COL. CHAS. W. RICHARDSON, M. D.,

WASHINGTON, D. C.

In a long clinical experience covering a period of thirty years I have seen the evidences of syphilitic infection of the upper air tract in almost every phase, stage and variety in which it is wont to appear in this region. The case which I shall describe this day, while being a tertiary necrosis and therefore not unusual in the life history of syphilis, presents several points of extreme interest—that is, the manner of its onset and the area of bone infected.

Mr. M. F., age twenty-six years, married, stock broker's clerk, consulted me first on April 16, 1917, on account of extreme pain in the lower third of the left nasal cavity. The family and general medical history as given by the patient seemed to have no bearing upon the case. The pain was described as being continuous, localized in the floor, over the lower portion of the inferior turbinate, and on the extreme lower portion of the septum near the floor. This symptom was present only in the left nasal chamber. The pain was so intense as to cause interference with sleep. The patient in no sense described the pain as greater at night. There was no alteration of function within the left nasal chamber. No symptoms other than pain and interference with sleep were complained of by the patient. The pain had already endured for several months. The young man had been under other special care before he came under my observation. He said that his former physician had stated that his condition was due to a spur of the septum, which was forthwith removed, without giving relief.

Physical Examination.—Investigation of the nasal chambers

*Read before the American Laryngological Association, May 27, 1918.

through anterior and posterior rhinoscopy revealed practically no deviation from the normal in the appearance of mucosa in either nasal cavity. Tenderness was especially marked in the lower anterior portion of the left nasal chamber, and particularly in the floor of the nasal chamber in this region. Careful examination of the incisor teeth demonstrated slight tenderness but no evident disease. Sinuses were transilluminated, special regard being paid to the left antrum, with negative results. The patient was referred to a roentgenologist for examination of the condition of the incisor teeth and the contiguous portion of maxillary bone. A negative report was received. As all other possible sources of such pain with negative objective symptoms had been eliminated, the patient was ordered to have a Wassermann made; with a double plus result. As the alveolar border over upper incision had become so intensely painful and so tender to the touch, I had these teeth extracted. The patient was immediately put upon salvarsan, but a little too late to spare him the destruction which had evidently started in before he came under my observation.

The destruction to which I refer was the complete necrosis of the intermaxillary bone on both sides. Shortly after removal of the teeth the evidence of necrosis began to be patent along the lower margin of the alveolar border in this region. In the course of several weeks, the whole mass of bone giving evidence of having separated, it was gently grasped with forceps and removed as one piece. By this time the patient had received three interavenous injections of salvarsan.

The important and salient feature in this case is, first, the severe, continuous pain for many weeks without any objective signs. Second, the severe necrosis, with the formation of complete sequestrum without any inflammatory swelling, and third, the complete limitation of the necrosis within distinct anatomic borders.

XLI.

TWO CASES OF UNUSUAL WOUNDING OF THE LATERAL SINUS.

BY VIRGINIUS DABNEY, M. D.,

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These two cases do not show an anomalous position of the sinus so much as an unusual place for its wounding.

E. D., twenty-two years old, a very robust young girl, of excellent habits, in whom no tuberculosis or syphilis could be demonstrated, gave a history of a discharging ear for the past ten years, perhaps longer. The fetor was marked, the tympanic membrane totally destroyed save a crescentic fragment at the upper and outer quadrant, and the ossicles all gone. For the past few weeks she had had severe frontal headache and an evening temperature as high as 100° F. The classical Schwartze-Stacke operation was done, and a well developed pneumatic mastoid uncovered. A smooth walled cavity, presumed to be the antrum, and certainly placed where it was proper to expect it to be, was found, and supposed to have been somewhat exenterated, as is frequent in chronic discharging middle ear cases coming to operation. In curetting the roof of this cavity a gush of dark blood appeared, and the typical hemorrhage of a sinus wound followed. Subsequent examination of the part showed that there had been apparently a parietal thrombosis, which had organized and left a small channel in the upper part of the horizontal limb. The pressure of the cholesteatomatous mass had caused an erosion of the organized clot as well as of the bony groove. This was plainly visible after the operation was concluded. Of course, the true antrum was a mere slit wedged in between the bridge and the sinus, as is so often seen in anomalous cases. After two years there has been no middle ear discharge, and it is perhaps fair to conclude that the operation is a success.

E. L., a thoroughly unhealthy, septic boy of thirteen years of age, looking specific but giving no positive evidences of

syphilis or tuberculosis, had had a discharging ear as long as he could remember. The discharge was constant and of great fetor; the drum showed a large central perforation, and the ossicles were all present in part, about two-thirds of each being absent. Cholesteatoma could be seen in the tympanic cavity. The usual radical operation was begun, but on elevating the insertion of the sternomastoid muscle from the mastoid tip a profuse dark colored hemorrhage occurred and was most disconcerting so early in an operation. As often as pressure was removed the flow of blood returned. The area was packed off, and the operation completed, working above and around it. The flap was cut and left unsutured at the lower angle. Three days later I attempted to clear the tip, but was only partially successful. However, at the next attempt, two days later, the whole tip was removed, the remaining open skin and flap parts being freshened and united. The last two operations showed that the pressure of the cholesteatoma and the erosive effect as well, perhaps, of the discharge had opened a large area in the cortex, through which the sinus had protruded and become adherent to the periosteum and tendon of the muscle.

It is worthy of note that neither sinus was infected, though both were opened in the presence of cholesteatomatous masses and a streptococcic infection, and that both cases seem to be dry and healthy still, two years after operation.

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XLII.

DIGEST OF AMERICAN AND ENGLISH OTOLOGIC LITERATURE FOR THE YEAR 1917.

By OTTO M. ROTT, M. D.,

SPOKANE, WASHINGTON.

I.—Relation of the Ear to General Diseases.

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2. Beck, J. C.: Relation of the Glands of Internal Secretion to Oto-Laryngology. Laryngoscope, St. Louis, 1917—XXVII—422.
3. Pollock, H. L.: Importance of Internal Secretions in Ear, Nose and Throat Affections, with Special Reference to the Hypophysis. Laryngoscope, St. Louis, 1917—XXVII—430.
4. Tanaka, Fumio: Histopathology of the Internal Ear in Typhoid Fever, Purpura Hemorrhagica and Epidemic Cerebrospinal Meningitis. Laryngoscope, St. Louis, 1917—XXVII—608.
5. Bane, W. C.: Acute Otitis Media of Diphtheritic Origin. Laryngoscope, St. Louis, 1917—XXVII—626.
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7. Dench, E. B.: Aural Complications of Grippe. Med. Press and Circ., Lond., 1917—CM—392.
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9. Weinstein, J.: Otitis Media as a Complication of Pneumonia. Med. Rev. of Rev., 1917—XXXIII—46.
10. Cary, E. H.: Aural Phenomena, the Result of Unusual Influence. South. M. J., Nashville, 1917—X—249.
11. Eagleton, Wells P.: The Importance of Aural Symptoms in the Early Diagnosis of Tumor of the Cerebellopontine Angle. J. Am. M. Ass., 1917—LVIII—333.
12. Ide, Clarence E.: The Relation of Obstruction of the Eustachian Tube to Local and Systemic Conditions and to Prognosis Regarding Restoration of Hearing. Laryngoscope, St. Louis, 1917—XXVII—14.
13. Fraser, J. S., and Muir, Richard: The Pathology of Congenital Syphilitic Disease of the Ear. J. of Laryngol., Lond., 1917—XXXII—8.

Emerson¹ discusses the place of specialism in association with the whole general field of medicine and presents a very

complete list of the various pathologic conditions in other branches of medicine which may be due to lesions of the ear, nose and throat.

Beck² and Pollock³ believe that the pathologic changes in the bony capsule of the labyrinth in otosclerosis are analogous to the bony changes in osteomalacia, and report good results in the treatment of otosclerosis by the hypodermatic injection of adrenalin. In some cases the extracts of the adrenal, thymus and pituitary glands were given. While the claim is not made that the condition improves, the authors assert that by injections of 1/1,000 adrenalin solution from one to fifteen minims, in gradually increasing doses, the otosclerotic process has shown a tendency not to progress.

From a histopathologic study of the internal ear in cases of typhoid fever, purpura hemorrhagica and epidemic cerebrospinal meningitis, Tanaka⁴ has found the following changes:

1. In typhoid fever there was evidence of otitis interna or neuritis acoustica.

2. In purpura hemorrhagica there were hemorrhages in the internal ear.

3. In epidemic cerebrospinal meningitis there was found hemorrhagic purulent inflammation in the middle and internal ear, and the case in question proved that in this disease inflammation of the labyrinth may occur as a result of blood infection.

Bane⁵ reports a case of true diphtheritic acute purulent otitis media of both ears, in a patient of seventy-two years. The otitis media went on to the chronic stage, as is usual in this infection.

Wilcutt⁶ offers a case report of complete unilateral deafness resulting from acute parotitis, but no attempt is made to discuss the pathology or to locate the primary lesion, whether it is in the middle or the internal ear.

Dench⁷ draws attention to the rôle played by influenza in causing aural complications. He says that these otitic complications are nonspecific, as in almost all cases of so-called influenza otitis the infecting organism is the streptococcus and rarely the bacillus influenzae. What the influenzal infection does is to lower the general bodily resistance.

Palen⁸ believes that the percentage of systemic infections

from aural conditions is equally as large as is that from the tonsils or the sinuses and teeth, the actual increase in number of systemic infections from the latter being due to the greater number of sinus and teeth foci in comparison to the aural diseases. Infection from aural conditions take place: (1) By drainage into the throat through the eustachian tube; (2) through the blood or lymph systems; (3) by extension to surrounding structures, the general infection resulting from the secondary condition; and (4) by formation of a secondary focus.

Weinstein⁹ reports two cases of otitis media as a complication of pneumonia. One was a baby, the other a child of two and a half years. In both cases the pneumonia had apparently cleared up, but the patients continued to run a septic temperature. An aural examination showed a perfectly normal drum, and there was no pain in the ears. But to eliminate a possible ear complication an incision was made in both ears in each case. In both cases pus was liberated and a pronounced drop of temperature took place. Both patients made a rapid recovery.

Cary¹⁰ cites several cases with pain in ears and mastoids, tinnitus, deafness and dizziness, which were of a reflex character, the source of irritation being in some instances a spasm of the ciliary muscle of the eyes, relieved by properly selected glasses, and in others an impacted tooth.

Attention is directed to the importance of a knowledge of the distribution of the fifth, seventh and ninth nerves.

The author's explanation of the mechanism whereby tinnitus aurium, closure of the eustachian tube, retracted and hyperemic drum and pain in the ear are produced by chronic ciliary spasm, is quite interesting and instructive, opening up as it does a field of thought too frequently left untilld by the otolaryngologist:

"The tonic spasm of the ciliary muscle required an enormous number of impulses over the third nerve, hence the sympathetic control became involved in harmonizing these extraordinary demands. The impulses of the sympathetic through the otic ganglion became involved, and certain nerve

fibers, such as the branch to the tensor palati, tensor tympani, and levator palati, lose their control.

"For instance, the normal eustachian tube is partially closed and is opened in two ways: First, by the act of swallowing when the tensor palati and levator palati muscles open it for air to equalize a partial vacuum produced by swallowing a part of the air in the upper pharynx; secondly, the sense of atmospheric pressure from without is the signal for pressure to be equalized from within, and this sense acts as a stimulus to the nerves controlling the tensor palati and likely the levator palati, which then respond by opening the eustachian tubes. These muscles are under sympathetic control; the motor root of the fifth through the otic ganglion goes to both the tensor tympani and the tensor palati. Hence an immediate effect of disturbed impulses would be inactivity on the part of these muscles, the tensor palati influencing the opening of the tube directly, the tensor tympani indirectly, through relaxation of the tympanic membrane. Then the levator palati becomes involved in its activity through the blunting of the senses of necessity. So the eleventh is not active. The air in the tubes and middle ear is more or less absorbed and then we have negative pressure; then the ninth nerve distribution through the otic ganglion becomes disturbed, either directly as the fifth through the sympathetic, or it does so through negative pressure and relaxation of the vessels. Consequent hyperemia brings about further closure of the tubes, with pain radiating throughout this nerve's distribution. It is distributed to the oval and round windows of the internal ear and in several ways could disturb the labyrinthian circulation, bringing about dizziness. And it is conceivable that the mechanism can be from a point of irritation through any of the ganglia."

Eagleton²¹ dwells on the importance of aural symptoms in the early diagnosis of tumor of the cerebellopontine angle, and cites two cases illustrative of his theme. One case was an endothelioma springing from the dura, causing great compression of the cerebellum in which aural symptoms were present for years before general symptoms of tumor were manifest. The other case was a small tumor with a large secondary cyst of cerebellum, causing great hydrocephalus in which during life spontaneous nystagmus was absent and vestibular

reactibility was at times present and again absent.

The aural manifestations of cerebellopontine angle tumor are: (1) Progressive deafness, beginning with a disturbance of the proper relationship between the degree of hearing and the tuning fork reaction, especially the duration of the bone conduction to the degree of deafness, and ending in (2) total deafness; associated with (3) loss of vestibular reactivity of the affected side; and during the time that the vestibular apparatus is still functioning (4) a gradual readjustment of the vestibular apparatus of the contralateral as well as of the homolateral side is taking place, which is manifested by (a) a reduction or even a temporary abolition of its reactivity to the cold caloric (at least, when applied in the upright position); (b) an absence of the vertigo and vomiting which normally accompany the induced nystagmus from the cold caloric, and (c) absence of spontaneous pointing deviations. As the cerebellar cortex becomes affected, however, may be added (5) spontaneous nystagmus; (6) spontaneous pointing deviations, and (7) absence during an induced nystagmus of the normal pointing deviations of the homolateral side.

Idé¹² mentions various general conditions which give rise to tubal obstruction. General conditions, such as gout, syphilis, intestinal toxemia, and acidosis are mentioned, as well as certain drugs, such as quinin and the salicylates. Focal infection from teeth, tonsils and sinuses also give rise to tubal obstruction.

Fraser and Muir¹³ make an excellent contribution to the subject of congenital syphilitic ear disease. After reviewing the literature, they give a detailed report of the microscopic examination of both ears and summarize the changes found in their case:

1. Chronic adhesive process in the tympanic cavity, especially in the upper parts. The submucosa is greatly thickened, and shows cystic spaces filled with mucopus, but there is no perforation of the tympanic membrane.

2. Ankylosis of the malleus (and incus on the right side) to the external attic wall.

3. Necrosis and exfoliation of bone from the posterior-superior wall of the external meatus.

4. Invasion of the labyrinth capsule from the deep layer

of the swollen and infiltrated submucous tissue of the attic, aditus and antrum, and to a less extent from the submucosa of the lower part of the tympanic cavity.

5. Marked changes in the marrow surrounding the labyrinth capsule, of the nature of a chronic osteomyelitis. These changes in the marrow are continuous with the inflammatory process, spreading in from the deep layer of the submucosa of the middle ear. The marrow around the labyrinth capsule shows marked leucoblastic reaction, while that in immediate contact with the cartilage bone of the labyrinth capsule is converted into granulation tissue and shows numerous giant cells but no caseation.

6. Erosion of the bony capsule of the labyrinth by the phagocytic marrow to such an extent that the inflammatory changes reach the endosteum of the labyrinth, especially in the region of the three semicircular canals.

7. Filling up of the perilymph space of the canals by granulation tissue which contains giant cells, and compression or obliteration of the endolymph space in these regions.

8. Obstruction of the endolymphatic aqueduct as it passes through the bone to the posterior cranial fossa.

9. Great dilatation of the membranous labyrinth.

10. Formation of new connective tissue in the scala tympani.

11. Secondary degenerative neuritis of the nerve structures of the membranous labyrinth.

12. Slight small cell infiltration within the arachnoid sheath at the fundus of the internal auditory meatus (meningitis).

The authors conclude that, in their opinion, the changes in the membranous labyrinth and in the nerve ganglia are secondary to those in the middle ear and labyrinth capsule, and that otitis media plays a much more important part in the production of congenital syphilitic deafness than has hitherto been supposed.

II.—Hearing Tests.

REFERENCE.

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Perception Deafness.) *Annals. of Otol., Rhinol. and Laryngol., St. Louis, 1917—XXVI—31.*

Downey¹ condemns the usual method of making the Rinné test by comparing the duration of air conduction with the duration of bone conduction, but insists that instead of this method we should determine

1. Whether or not air conduction is normal.
2. Whether or not bone conduction is normal.
3. In which course of sound conveyance lies the defect, or the greater defect, in hearing.

In other words, the Rinné test should be made as recommended by the Eighth International Otological Congress, 1909, by a separate test of air and bone conduction and the result recorded accordingly.

The reason for this is because the decrement of the vibrations of a tuning fork is not uniform from second to second, but is much more rapid at the beginning than near the end, for the reason that the amplitude decreases by geometric progression.

The practical significance of this is that in all tests, with all tuning forks the duration of the perception, both abnormal and normal, must be determined and noted, and the difference in time between the defective and normal perception of the duration of the vibrations, and not the duration of perception itself, taken as the factor of importance and the one which must serve as the index of defective audition.

The whole matter is summarized as follows:

1. By both air and bone conduction it is necessary that we have some index which will indicate the intensity under which a tuning fork is heard, and the simplest way to obtain a factor of this description is by comparing the abnormal duration of perception with the normal duration of perception and taking the difference between the two as the significant indicator.

2. As the energy necessary to make a tuning fork heard by bone conduction is markedly greater than the energy necessary by air conduction, the normal duration of perception of each is different; therefore, we may not directly compare the one with the other, but we must make separate tests of each course of sound conveyance.

3. Conduction deafness shows:

(a) The Weber reaction referred to the ear complained of or said to be the deafer;

(b) The bone conduction for the C² fork equal to or greater than the normal in duration of perception;

(c) The air conduction for the C² fork reduced in duration of perception as compared to the normal;

(d) The air conduction for the C fork reduced in duration of perception as compared to the normal, and to a greater degree than for the C² fork;

(e) The air conduction for the C⁵ fork normal in duration of perception.

4. Perception deafness may be considered complete when the field of hearing is as follows, assuming that the lesion is unilateral.

(a) Weber referred to the better ear;

(b) Bone conduction for the C² fork is negative, the good ear being suppressed with the noise apparatus;

(c) Air conduction for the C² fork is negative, the good ear being suppressed with the noise apparatus, and the C² fork, stimulated to its greatest intensity, is not heard by the stethoscope method;

(d) Air conduction for the C fork is negative under conditions just described (c);

(e) Air conduction for C⁵ fork is negative, the good ear being suppressed with the noise apparatus.

5. Between the labyrinthine and eighth nerve affections the following differential points are offered:

(a) If the intralabyrinthine structures are completely involved, there is total deafness both by bone and air conduction;

(b) If the intralabyrinthine structures, excluding the nervous elements, are but partially involved, there is deafness by bone and air conduction, but as a rule the degree of deafness will be greater by air conduction than by bone conduction;

(c) If the nerve itself is involved, the deafness will be total in high degree of neuritis, both by air and by bone conduction;

(d) In partial acoustic neuritis the bone conduction will be reduced out of all proportion to the air conduction.

6. Partial labyrinthine deafness shows:

(a) Weber usually referred to the better ear. At times to the bad ear in cases showing but slight reduction in bone conduction;

(b) The bone conduction for the C² fork reduced at least ten seconds in duration of perception, usually from one-half to two-thirds the normal duration;

(c) The air conduction for the C² fork negative or markedly reduced in duration of perception;

(d) Air conduction for the C fork negative;

(e) Air conduction for the C⁵ fork negative.

7. Partial nerve deafness shows:

(a) Weber referred to the better ear;

(b) The bone conduction for the C² fork greatly reduced or negative in duration of perception;

(c) The air conduction for the C² fork better in duration of perception, or reduced to the same extent as the bone conduction for the C² fork;

(d) The air conduction for the C fork of good perception duration in recent cases, reduced markedly in old cases, but never negative;

(e) The air conduction for the C⁵ fork reduced in duration of perception or negative.

III.—Vertigo and Vestibular Tests.

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4. Jones, I. H.: Value of Barany Tests in the Diagnosis of Vertigo, from Whatever Cause. *J. Am. M. Ass.*, Chicago, 1917—LXIX—812.

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6. Jones, I. H., and Fisher, Lewis: The Technic of Examina-

tion of the Static Labyrinth. *Ann. of Otol., Rhinol. and Laryngol.*, St. Louis, 1917—XI—1.

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Mackenzie's¹ observations on after-turning nystagmus in one hundred and seventeen cases are not in accord with those of Bárány. The author presents tables showing where his findings disagree with those of Bárány, and he offers the explanation that Bárány's technic was inaccurate. Whereas Bárány found wide discrepancies in the duration of after-turning nystagmus in normal individuals, Mackenzie found the duration more constant, the average duration being twenty-four seconds as against forty-one seconds mentioned by Bárány.

Concerning the value of the galvanic method of testing the functions of the inner ear and eighth nerve, Mackenzie² offers the following conclusions:

1. That the galvanic test is more accurate than either the caloric or rotational test in determining the function of the semicircular canals.

2. Besides being more accurate, the galvanic test is the least annoying to the patient, the most sensitive, and the easiest to control of the labyrinthine tests.

3. That the galvanic test can be applied as a unilateral test of semicircular canal function in all sorts of pathologic conditions, which is an advantage that cannot be conceded to the caloric.

4. That the galvanic test is applicable to cases of suspected unilateral labyrinth suppuration with obstruction in the external canal where the caloric may fail.

5. That the galvanic test is a unilateral quantitative test of semicircular canal function, which is a distinct advantage over the rotational test which at best is a bilateral test.

6. That the galvanic test is the only one whereby a differential diagnosis between labyrinth destruction, pure and simple, and eighth nerve neuritis can be made.

7. That the galvanic test is the only one for testing the function of the eighth nerve in cases of neuritis or in cases of secondary degeneration following destruction of the inner ear.

8. That the galvanic test is the only test available for determining the progress of eighth nerve neuritis, whether favorable or unfavorable.

From a study of the static labyrinth in twenty-eight cases of positively established syphilis Downey³ states that the most characteristic reaction is a lowering and confusion of all responses, varying from the totally dead labyrinth, giving no responses, to the cases showing all the normal reactions reduced in degree. For example, the nystagmus will last but ten to fifteen seconds or less, and will show fine oscillations in which the slow and quick components cannot be easily differentiated. Vertigo is absent, or it lasts but a few seconds. Falling is not definite. The patient, if tested quickly after rotation, will past-point with one arm, and not with the other, or will only past-point for a few inches, or will past-point incorrectly. The responses may be intensified by increasing the stimulation; thus, nystagmus may be absent after ten turns in twenty seconds, to become evident for some seconds after ten turns in ten seconds. Douching with water at 68° F. will bring on the same reduced or confusing reactions after a much longer period than the normal forty seconds, or it may require much colder water to bring out any response. Furthermore, it is apparently possible in these cases for one semi-circular canal of the same ear to be more affected than the other; hence we may get all normal responses from rotation with the head in the upright position (horizontal canals), and no reaction with the head forward (vertical canals), or vice versa.

Increased irritability of the static labyrinth, crossed past-pointing and complete reversal of past-pointing has also been noted. The responses frequently vary from time to time.

In any case of vertigo Jones⁴ urges that the first thing to be done is to examine the ear mechanism which is responsible for the vertigo, just as we examine the urine in nephritis or

diabetes, or as we have a Wassermann test made in cases or suspected syphilis. Only rarely does a "dizzy case" remain obscure after these ear tests, and in most instances the diagnosis becomes clear and simple. The vestibular tests will reveal either normal or abnormal responses. If the responses are abnormal, the tests will help to locate the point of the disturbance, either within the ear itself or along its pathway within the brain. If the responses are normal, the diagnosis is narrowed down to (1) a purely functional neurosis, (2) ocular disturbance or (3) an evanescent toxemia, the source of which must be searched for.

Jones⁵ cites how the vestibular tests may be of value to the different specialties:

(a) Value to the General Practitioner: Vertigo means a disturbance of the equilibratory apparatus, and just as tests are made for nephritis, syphilis, etc., the ear tests enable one to know the reason for vertigo and the diagnosis is clearer.

(b) Value to the Otologist: In a case of deafness these tests give a positive data of the functioning of the internal ear. In tests for hearing, one never knows whether or not the labyrinth is destroyed, but here the new tests are valuable.

(c) Value to the Ophthalmologist: Nystagmus can be produced in various directions by the different ear tests. The eyes may be caused to dance violently if there is caries of the bone in outer wall of the labyrinth producing a fistula into the internal ear, or if the stapes is unduly mobile in the oval window and a Politzer bag is applied, causing pressure or suction. These tests are practical in the study of eye palsy and spontaneous nystagmus, which cause is not easily determined when the lesion lies not near the surface.

(d) Value to the Syphilologist: The early diagnosis of syphilis is not always easy but very important, as prognosis depends on how quickly the treatment is given, and a Wassermann test is not always absolute. Ear tests are valuable in the impairment of the eighth nerve function. It occurs a few weeks after primary infection, and in beginning involvement of the central nervous system, as the nervous system is infected in five per cent. The eighth nerve is very vulnerable to this disease, and an analysis of the intracranial pathways from the eighth nerve demonstrates a beginning involvement of

the nervous system several years before it can be detected by other methods.

(e) Value to the Neurologist: The differential diagnosis between the labyrinth and the intracranial lesions. The neurologist wants an eye test, and the otologist must be ready with his ear tests, which will give more definite information than the eye.

(f) Value to the Surgeon: The diagnosis of intracranial localization is a most difficult one, and the ear tests have proven valuable in locating lesions. And they may be helpful in preventing unnecessary operations. No brain should be opened without information from ear tests.

Jones and Fisher⁶ describe in considerable detail their technic, and present an illustration of their chart, in which all the tests are outlined in the order in which they are usually undertaken, and which is so arranged that when properly filled in, it shows all the vestibular data simply by a glance at one page.

One side of the chart is devoted to miscellaneous details or such routine matters as are found on any chart, with particular emphasis on the examination of the cochlea. The other side is devoted exclusively to the vestibular tests, of which there are three divisions: (1) Spontaneous, (2) Turning, (3) Caloric. The spontaneous phenomena of nystagmus, vertigo, pointing and falling should be searched for first and properly noted. Next the induced phenomena by the turning and the caloric tests are to be studied and recorded.

Before drawing conclusions, the authors urge the importance of proper technic, so as to make sure that the proper stimulus was applied, and offer the following points to be remembered:

(a) The desirability of testing only one set of canals at a time;

(b) In the turning chair only those canals are tested which are in the horizontal plane;

(c) The caloric test affects only those canals which are in the vertical plane;

(d) Each canal when stimulated, produces a nystagmus and a vertigo in its own plane;

(e) The eyes are always drawn in the direction of the

endolymph movement (this is the slow component) ;

(f) The vertigo is always in the direction opposite to the endolymph flow.

First the turning tests are made. By tilting the head forward thirty degrees, the horizontal canals are placed exactly in the horizontal plane. During the turning the patient's eyes are closed. The chair is rotated to the right ten times during twenty seconds, then stopped. The patient is told to open his eyes and look off at a distance, when the "after-turning" nystagmus is noted, including its direction, character and duration. In a similar manner the patient is turned to the left.

In testing the past-pointing after turning, the patient is again turned, but twice as fast, namely, ten times in ten seconds. Eyes are kept closed. When turning is over, the patient's right hand is quickly grasped, and after his forefinger touches the examiner's finger, the examiner says "up," upon which the patient raises the arm in question to the perpendicular and immediately tries to come back to the examiner's finger. The degree and direction of the past-pointing is recorded, taking each hand separately until both hands touch the examiner's finger.

In the caloric tests, water at 68° F. is employed. The vessel containing the water is placed about two feet above the level of the ear to be examined. Patient's head is placed thirty degrees forward so as to have the vertical canals in the vertical plane. Patient looks toward the floor, and the time it takes to induce nystagmus is recorded. The direction and amplitude of nystagmus is noted, and immediately the tests for past-pointing are made once with each arm.

Other tests are sometimes made for special conditions, but not for routine work.

Fisher⁷ defines vertigo as a conscious sensation perceived within the brain when perfect equilibration is interfered with, and draws attention to the close relationship between vertigo and the internal ear, explaining the value of the new ear tests in determining the cause of vertigo, no matter what its type or origin.

Vertigo may be of two kinds: First, experimental or induced vertigo produced by the turning, caloric or other tests which cause an artificial stimulation of the vestibular end

organ, and, second, vertigo resulting from disease, which occurs whenever there is an interference with the perfect balance between the static organs on each side. The important thing to remember is that it is always a disturbance of the ear and its associated pathways that can result in vertigo and nothing else. When remote organs produce vertigo it is only because they definitely influence the ear mechanism.

Vertigo may be caused by:

1. Lesions within the internal ear, such as labyrinthitis of the various types, or effusions or hemorrhage within the internal ear.

2. Toxemias affecting the ear or other portions of the vestibular apparatus, such as ptomain poisoning, constipation, alcoholism, nephritis, gout, rheumatism, syphilis, the infectious fevers, etc.

3. Definite lesions along the pathways from the ear, within the brain itself, such as tumor, hemorrhage, infarct, thrombus, abscess, gumma, tubercle.

Weisenburg⁸ discusses vertigo as found with intracranial tumors, tumors of the cerebellopontine angle, tumors of the cerebellum, as well as functional vertigo and epileptic vertigo.

Shambaugh,⁹ in discussing the vertigo which is due to primary disease of the labyrinth, offers the following conclusions:

1. Primary disease of the labyrinth produces attacks of vertigo whenever the vestibular apparatus is involved by an acute process;

2. Hemorrhage into the labyrinth is much less common than was formerly supposed;

3. An embolus lodging in the labyrinthine artery occurs especially in caisson workers, as the result of gas emboli, and gives rise to the characteristic Ménière syndrome.

4. Syphilis in the secondary and tertiary stages, as well as in hereditary syphilis, not infrequently involves the internal ear and gives rise to vertigo;

5. Neuritis of the eighth nerve from overdoses of drugs, such as quinin, tobacco and alcohol, may produce neuritis of the eighth nerve with the Ménière syndrome.

6. Toxic neuritis of the eighth nerve as the result of infectious fevers frequently gives rise to attacks of vertigo;

7. The most frequent occurrence of vertigo is in connection

with a primary chronic degenerative process involving the peripheral neurons of the eighth nerve and occurring independent of syphilis or the infectious fevers;

8. The probable cause for many of these cases is to be found in a neuritis of the eighth nerve, as the result of some chronic focus of infection, such as is so frequently seen in chronic disease of the faucial tonsil;

9. Attacks of vertigo occurring in connection with acute articular rheumatism are the result of neuritis of the eighth nerve and a symptom of the systemic infection from some primary focus.

Kerrison¹⁰ takes up that phase of vertigo due to suppurative labyrinthitis. There are two clinical types: (1) The vertigo of the onset or acute stage, and (2) the vertigo of the latent or quiescent stage.

The vertigo of the acute stage is accompanied by the following invariably associated phenomena: Spontaneous vestibular nystagmus; subjective sensation of the rotation of surrounding objects in the plane of the nystagmus, and tendency of the patient, if standing, to fall or move in the plane of the nystagmus and in the direction opposite to that of the quick eye movement.

IV.—Diseases of the External Ear.

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2. Mathers, R. P.: Vincent's Disease of the External Ear Occurring in the Course of Chronic Middle Ear Suppuration. *J. Laryngol.*, etc., London, 1917—XXXII—159.

Dean and Gittins¹ report a case of bilateral congenital osseous atresia of the external auditory canal in a patient fifteen years of age, with an exceptionally good functional result following operation. Where before operation the whispered voice was heard at two inches, after the operation the whispered voice was heard at forty feet. Following a simple mastoidectomy, the thick wall of bone between the mastoid cavity and glenoid fossa was removed externally to the con-

cave depression in the concha. Thiersch grafts were used.

An extensive review of the literature accompanies the case report.

Mathers² reports a case of Vincent's disease of the external ear. After applications of boric acid fomentations for two days the membrane disappeared. A few weeks later a radical mastoid operation was performed without any complications.

V.—Nonsuppurative Diseases of the Middle Ear.

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Heller¹ reports a case of catarrhal deafness in which the etiologic factor was a gumma in the fossa of Rosenmueller. There were no other symptoms and no history of syphilis. Antisyphilitic treatment caused a disappearance of the growth and the deafness.

Dworzak² considers the catarrhal adhesive process and otosclerosis suitable for radium therapy. The therapeutic object is to stop the rapid progress of the disease, to lessen if possible the head noises, to eliminate the disagreeable head symptoms, and if possible to improve the hearing. Both the radium rays and the radium emanation are used. The application is made directly in the tympanic cavity. The amount of radium varies from one to ten mlgm. radium element. The radium tubes are applied by means of the radium applicator and are centered in the ear by means of the head band, to which is

attached a small ear speculum, by which it is possible to introduce and remove the applicator and to watch the reaction. A brass filter eliminates the alpha and beta rays, and the therapeutically active gamma rays penetrate the tympanum and middle ear. Besides this, a large amount of radium is employed to ray the entire ear region. The author considers the effect of the radium to be purely destructive here in eliminating the proliferating pathologic tissue, and partly in a selective action on the terminal nervous ramifications. The radium emanation is manufactured in an emanator of special construction. Out of the tank oxygen bubbles through the liquid in the bottle which contains the radium in solution. The quantity of this oxygen is nicely regulated. The oxygen takes up the radium emanation and can be used for inhalation by means of a mask or in a room, for the activation of water for drinking purposes or for the treatment of the ear directly in blowing it through the eustachian tube in the middle ear. In the latter case the author employs the pressure of the oxygen alone or combines the emanator with the Meyer-Rowan instrument, so that sound waves or air under pressure will force the emanation into the tympanic cavity. At times the patient inhales the radium emanation, and he also inflates the eustachian tube by Valsalva's test. In all cases it is necessary to remove the excess radium emanations after treatment by means of suction from the external auditory meatus or by pressure through the eustachian tube or both combined, for radium emanation remaining in the middle ear could ultimately cause damaging after-effects. Radium D, one of its products of decomposition, lasts sixteen years, and might remain active too long in the middle ear. The radium emanation acts like a strong and active ferment, and therefore it deserves a prominent place in the treatment of internal diseases. In the course of the treatment three phases can always be recognized: 1. The pathologic symptoms become more severe and general unrest is exhibited by the patient. 2. Later a constant euphoria sets in, and all the symptoms of disease disappear. 3. Finally, a supersaturation seems to arise, with insomnia and unrest, occasionally accompanied by the old pathologic symptoms. An intermission in the treatment causes a disappearance of these symptoms in a few days.

The author cites four cases out of fifty-three similarly treated by the above method. In almost all the cases he found either an improvement or a complete cure—in twenty-two cases—of tinnitus. In twenty-four cases there was striking improvement; in seven cases there was no reaction whatever. The rest of the patients—four—left town before treatment was completed.

Brown³ has found that hot air and calomel vapors are superior to any other form of eustachian, aural, catarrhal and other inflammations of the mucous membranes. For catarrhal deafness he uses a gentle current of hot air, which is projected into the nose, and the patient directed to swallow every few moments. Where the eustachian tubes are obstructed they are inflated with hot air. Calomel vapors are then applied to the nasal chambers or directly to the middle ear. Two to three grains of calomel are sufficient for the nasal treatment.

Robinson⁴ supplements the local treatment for catarrhal deafness by a season of Spa treatment. Inflations of medicated vapors are used as well as tympanic massage. The electric therapeutic lamp applied by approaching to, or removing the lamp from, the ear from moment to moment, has given good results. The lamp should be employed daily during five minutes.

As the sclerosis of the ossicles in the ear is in many instances merely a local expression of a rheumatic, gouty or rheumatoid arthritic condition, these general dyscrasias should receive their appropriate general therapy.

Hays⁵ has brought the surgical art to his aid in the treatment of catarrhal deafness. The author's procedure is to make an incision between the auricle and the temporal bone in the natural fold present there. The incision extends from the upper pole of the auricle downward to the top of the mastoid. This incision is deepened until the periosteum of the mastoid is reached, when the dissection is continued downward along the posterior cartilaginous wall to the junction of this cartilaginous wall and the bony canal wall. An incision is made at this point of conjunction, and the auditory canal is incised for about two-thirds of its circumference. The auricle and deeper tissues are thrown forward and held in position with a sharp retractor. With a sharp chisel the small

ledge of bone overhanging the superior canal wall is chipped away, thus giving a full exposure of the drum, which is only three-eighths of an inch away from the severance of the canal. To incise the drum, the incision is begun in the upper portion of Shrapnell's membrane posteriorly, and continued along the circumference of the drum to the anterior quadrant. A flap of the drum thus made is thrown forward over the malleus. Through this opening the operator's work is carried out. The author has operated on two cases of catarrhal deafness, but what the ultimate outcome will be remains to be determined.

Watson-Williams⁶ reports a case of chronic adhesive otitis, in which myringotomy and partial ossiculectomy was performed, with excellent immediate results. Under gas anesthesia, the author made a crucial myringotomy on left ear. Immediately after recovery from the anesthetic, the patient's hearing had improved from thirty-eight inches to seven and one-half feet for whisper. One month later the hearing was twenty-four feet, at which time the left membrane was more freely excised and the lower half of the handle of the malleus removed. In the discussion which followed this report, the consensus of opinion was that the ultimate result in these cases is far from what the immediate result would lead one to expect.

Emerson⁷ presents some new and interesting views concerning the treatment of chronic secretory otitis media. His conclusions are:

1. That every case of chronic progressive middle ear deafness has a primary focus, which persists as a low grade infection, subject to acute exacerbations. In chronic cases such foci are usually multiple.

2. Such primary focus is usually constant for the individual, and is indicated by the location of exacerbations.

3. Every case showing variable hearing can usually be improved up to their best hearing or more.

4. So-called cases of nerve deafness of nonspecific origin are, in the experience of the writer, due to toxemia from some definite focus.

5. Inflation in chronic cases is unscientific and harmful as a routine, as the tube is already open and has partly lost its

tone in the majority of cases; and in those cases not open, it does nothing to remove the cause.

6. Nasal obstructions do no harm to the middle ear unless infection is present. Such obstructions, however, are the primary cause in the development of imperfect drainage, which predisposes to infection, and which is always present in cases of chronic secretory otitis media originating in the nose.

7. Foci whether in the sinuses, tonsils, mandible or epipharynx, are potential factors in the progress of chronic progressive otitis media, either by direct extension or through the lymph and blood streams.

8. No hearing test will forecast the improvement in a given case as long as we have a positive Rinné with variable hearing.

9. Whatever the macroscopic appearance of the membrana tympani, the cause of the deafness is active for a long time outside of the middle ear as a toxemia, or low grade infection subject to acute exacerbations.

10. Constitutional diseases have but little effect upon the course of chronic secretory otitis media, except to lower the patient's resistance and make him more susceptible to exacerbations of his localized focus or foci.

VI.—Suppurative Diseases of the Middle Ear and Mastoid.

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Pierce¹ mentions the following factors as influencing the treatment of otitis media:

1. The location of the area of the middle ear involved—that is, whether the disease is more or less located in the tube, the tympanum or the mastoid.

2. The stratum that is involved—that is, whether it is relatively superficial, the epithelial structures being most affected, or the tissue under the epithelium, or whether it is the periosteal layer and bone.

3. The character of the pathologic process—that is, whether it is merely a pus producing microorganism, being a streptococcus, staphylococcus, or one of the various forms of diplococci, whether it occurs as a result of diphtheria or scarlet fever or of tuberculosis or syphilis.

Each case must be studied to determine which of the above factors is operating, and then the treatment is obvious.

Where the tube is the part chiefly affected, the therapy should be directed to the tube and nasopharynx. As regards other types, nonoperative procedures, such as cleansing and astringent measures, are sufficient as long as the disease is limited to the mucous membrane.

Jones² reports a case of facial paralysis complicating an acute otitis media, in a boy five years of age. Ten days after incising the bulging membrana tympani the paralysis had disappeared. The author is inclined to believe that such an occurrence is due to the projection of the swollen mucosa into the fallopian canal through a dehiscence rather than to the simple pressure of the exudate against the membrane covering such a deficiency.

Durkee³ reports a case of mastoiditis with a complicating cervical abscess which ruptured into the throat. The efforts to locate the opening in the throat were unsuccessful.

Keeler⁴ reports two unusual cases of mastoid disease with severe complications, which recovered after operation.

The first case was one of chronic mastoiditis, complicated by a palsy of the left facial nerve, an unresolved unilateral bronchopneumonia, pericardial effusion with adhesions to the parietal pleura and bilateral suppurative cervical adenitis. The interesting features are:

1. The preservation of the stapes and the remarkable resistance of the labyrinth to the prolonged infection which caused so much destruction of the surrounding tissues.

2. The facial nerve did not become involved until the ear had discharged continuously for more than one year.

3. An unusual vaginal infection with Gram negative intracellular diplococci. Patient was three years old.

4. The heart and lung conditions existed at the time of admission.

5. While the temperature was highest and the pulse the most frequent, there was present a distinct cervical, glandular, suppurative process.

6. The bronchopneumonia and the heart lesion were apparently not unfavorably influenced by the administration of ether.

7. The fortunate external rupture prevented possible intracranial complications.

8. The facial paralysis and the consequence disfigurement will be constant reminders of the evils of procrastination.

The second case was one of bilateral mastoiditis in an eighteen months old baby, complicated by a bilateral bronchopneumonia and circumscribed meningitis. This case presents the following interesting features:

1. Double bronchopneumonia concurrent with bilateral mastoiditis terminated in recovery only in a few reported instances.

2. The meningitis was fortunately circumscribed and was not purulent, as the examination of the spinal fluid, one day after the operation, showed.

3. The case teaches the importance of examining both ears.

In this patient the right one had been overlooked.

4. The value of rapidity of operation on cases of this serious character cannot be overestimated.

5. No matter how hopeless the patient, suffering from middle ear disease with mastoiditis may be, and no matter what complications may be present, it is good surgery to operate and relieve the pressure as soon as possible.

Boot⁵ reports two cases of hemorrhagic mastoiditis in which the mastoid cells at operation were found filled with dark clots, the streptococcus being the infecting organism. The onset was severe. The discharge was a bloody serum and was profuse. The mastoid tenderness was very marked and the temperature was moderate. There was considerable leucocytosis.

Keiper⁶ reports a case of acute mastoiditis in a four-year-old boy with leucocyte count of over 60,000. At first there was only trouble in one mastoid, which was opened. Later, because the pulse rate was high, out of proportion to the temperature, more trouble was suspected, and found in the other mastoid, which was opened. At the time the left mastoid was opened there was suspicious symptoms from the right, but because of a negative X-ray report, this mastoid was not operated at that time.

Freudenthal⁷ reports a case of mastoiditis developing after prolonged nasal packing for epistaxis, but the interesting feature was the necessity for doing a mastoid operation in a patient suffering from diabetes. Urinalysis revealed 4.4 per cent sugar plus acetone. The operation was performed quickly under gas anesthesia, just enough done to give free exit to pus. The outcome was extremely gratifying. The author considers the psychical condition a very important factor in major operations, as it undoubtedly was in this instance. The patient did not know that she was suffering from diabetes nor from a mastoid infection. She was told that an abscess had to be opened. The patient slept almost constantly for twenty-four hours after the operation; one-fourth grain of morphin had been given before.

Salinger⁸ reports two cases of subperiosteal abscess of the mastoid, which were cured by paracentesis. One was in a boy four years of age; the other, in a child twenty-two months of age. The potent factor, in the cure by this method, was a

patent squamomastoid suture. The author points out that in fifty per cent of all children less than two years of age, there is a patent squamomastoid suture, and this, together with the remarkable resistance of the drum membrane in young children as compared to adults, explains the occurrence of a subperiosteal abscess without rupture of the drum membrane, and even with preservation of the landmarks.

However, this method of procedure is advocated only in acute cases, where the drum has not been perforated and the middle ear drained, or where the perforation is inadequate, and then only with the proviso that there be no other threatening symptoms that would indicate necrosis in the mastoid adjoining other vital structures, such as the lateral sinus, the dura or the middle fossa, or the labyrinth. Furthermore, where drainage through the tympanic membrane has been effected, and the fluctuation and edema of the mastoid fail to promptly disappear, there can be no question as to the necessity of immediate incision into the bone.

Schreiber⁹ reports a case of salivary fistula following a simple mastoidectomy with a cervical abscess, and draws attention to the anatomic position of the parotid gland and the structures which it harbors.

Dighton¹⁰ reports a case of complicated Gradenigo's syndrome, in which there was paralysis of the right external rectus muscle, though the left ear was the one diseased and operated. The right ear was normal, but there was a history of a "one-time" suppuration in it. The only explanation given is that a reflex action had lighted up an old standing focus of disease in the right ear, and so caused a neuritis of the sixth nerve on that side.

Shambaugh¹¹ reports a case of suppurative otitis media with paralysis of the external rectus which persisted for eight months. The involvement of the sixth nerve was due to necrosis of the apex of the petrous portion of the pyramid.

Kerrison¹² contrasts the mastoid operation of ten years ago and of today in reference to the bone operation, the treatment of the soft parts and the after-treatment.

Concerning the aditus, formerly the simple establishment of drainage was sufficient; now it is considered necessary to remove granulations, as they may mark the site of a focus of

disease in the underlying bone, and if not removed may perpetuate the tympanic lesion. Excessive scraping of the bone is condemned in that it is injurious to the minute blood vessels within the bone, as a result of which repair is retarded until the vascular supply is reestablished. Bone vitality may even be injuriously affected. The author criticises the pressure of tight gauze packing, as delicate new granulations and capillaries are destroyed at each change of dressing.

Dench¹³ discusses the indications for the mastoid operation in acute otitis media, under the following headings: Pain, temperature, local tenderness, otoscopic examination, bacteriologic examination, duration of the inflammatory process, course following acute symptoms, history of repeated incisions, impairment of hearing, involvement of the static labyrinth, meningeal symptoms and roentgenoscopy. The signs indicative of the operation are: Persistent and severe pain for from twenty-four to forty-eight hours after free incision of the drum membrane; a persistent high or remittent temperature; recurring tenderness over antrum; bulging of upper and posterior portion of the drum membrane with a sinking of the corresponding meatal wall, especially if still present ten days after the inception of the acute infection; sudden cessation of discharge with coexistent canal signs; profuse discharge for more than three weeks after a paracentesis; toxemic symptoms dating from an acute otitis media; history of repeated incisions of the drum; profound impairment of hearing coexistent with acute otitis media; labyrinthine and meningeal irritation.

The value of the X-ray and the bacteriologic examination is mentioned.

If the infecting organism is found to be a streptococcus capsulatus the patient needs careful observation and should not be discharged until the hearing has been restored to the condition existing before the infection and all canal signs have disappeared.

Carter¹⁴ reports an interesting case of gas bacillus infection in a chronic mastoiditis. In incising the deep layers of the skin, gas escaped in fine bubbles. This edematous, emphysematous tissue was one and one-half inches thick. Then when the periosteum was incised there was an almost explosive

discharge of foul-smelling gas. The interesting features of this case are:

1. The rarity of gas bacillus infections of the mastoid.
2. The unusual route through which the infection traveled, namely, through the middle ear; the usual mode of entrance of the bacillus into the body being through an open wound or abrasion into which earth had been ground.
3. The prompt recovery following the operation, an unusual sequel to gas bacillus infections, for these cases usually succumb very quickly.

In considering the etiology of chronic suppurative otitis media, Clay¹⁵ states that besides the cases which are chronic from the start because of the nature of the causative agency, as, for instance, a tuberculous or a luetic infection, and those which are chronic because of the general debilitated condition of the patient, there are local etiologic factors which render an otherwise simple or acute otitis a chronic one. Such factors are some local nasal or nasopharyngeal abnormality, as septal deformities, hypertrophied turbinates, nasal polyps, collapse of the alæ nasi, chronic suppurative disease of accessory sinuses, diseased adenoids, adhesive bands in fossa of Rosenmueller and diseased tonsils.

Dwyer¹⁶ reports that in fifty-three cases of chronic suppurative otitis media, he has found the staphylococcus pyogenes aureus seventeen times; the staphylococcus pyogenes albus, six times; the streptococcus mucosus, eight times; the streptococcus hemolyticus, eight times; pseudodiphtheria (Hoffman's and Xeron's), fifteen times; pyocyanous, sixteen times; proteus, five times; Klebs-Löffler, once, and the bacillus mucosus capsulatus, three times.

As to the information to be obtained concerning the nature of the process by means of cytologic examination of the discharge, the author states that evidence of granulation tissue is afforded by the presence of leucocytes of all kinds, large and small mononuclear and polymorphonuclear, normal and degenerated, but especially by lymphocytes, which are very numerous, while epithelial cells are not uncommon. Bone disease may be marked by the presence of myelocytes or osteoblasts, or chemical analysis shows the presence of an increased amount of bone salts. Cholesteatoma is indicated by the pres-

ence of cloudy packed squares, with or without bacteria, a distinction that may at first glance appear unnecessary, but is really of great importance, especially when the cells are of central origin, for a septic cholesteatoma in that situation affords a stronger indication for radical measures than a non-septic one.

Among chronic discharges is one which is very profuse, fetid, opaque and like cream. This is free from cells, either epithelial or septic leucocytic, but consists of throat organisms in an albuminous matrix—not true pus, therefore, but a polymicrobial emulsion. This indicates no granulation, hence measures to do away with the throat infection are indicated. The author concludes his paper with a glowing tribute to the efficacy of vaccine therapy, properly controlled.

Dr. Mackenzie¹⁷ states that the pathology of chronic middle ear suppuration depends upon the etiology, or the factors that have been at work to make the condition chronic, such as were mentioned by Clay.¹⁵ Of the strictly pathologic changes in the ear itself, the author mentions cholesteatoma, polypi, granulations, caries and necrosis.

Concerning the prevention of the chronic condition Mackenzie¹⁸ states that the factors which delay healing of the acute condition are the cause of the chronic process, hence these should be ascertained and properly treated if the chronic condition is to be prevented. The following are mentioned:

- (a) Adhesive bands in the middle ear spaces;
- (b) Narrowing of the eustachian tube;
- (c) Any obstruction to drainage;
- (d) Adenoids and diseased tonsils;
- (e) Nasal obstruction;
- (f) Tuberculosis and syphilis;
- (g) Any diseases of the kidneys, heart, lungs, gastrointestinal tract or elsewhere which tends to depreciate the patient's health.

Boone¹⁹ praises the value of the Roentgen ray in the diagnosis of mastoid disease, stating that an infected mastoid will show a distinct cloudiness.

Recognizing the difficulties in making a diagnosis of the atypical case of mastoiditis, which so frequently occur because of the variations in the anatomic conformation of the temporal

bone, Clevenger²⁰ draws attention to the importance of availing oneself of all the aids at one's disposal, as, for instance, the nature of the infecting organism, the general resistance of the patient, blood examination and X-ray plates.

Summarizing the factors to be kept constantly in mind as essential to making an early diagnosis of mastoid disease, the author mentions:

1. Anatomic differences which produce a variety of objective and subjective signs.
2. Color and position of the drum membrane.
3. Color and character of membrane covering the posterior bony canal wall over the antrum.
4. Character of the bacteria found in the discharge.
5. Skiagraphic findings.
6. Three points of tenderness, namely, antrum, tip and veins—sometimes absent, due to thick cortex.
7. Ordinary tests for middle ear deafness.
8. Indefinite cranial pain with slight rise of temperature following history of acute middle ear inflammation, with or without discharge.

Ingersoll²¹ makes a plea for the stereoscopic roentgenograms. A note on the technic by Hill and Thomas accompanies the article.

Hays²² reports a radical operation for tuberculous mastoiditis, under cocain anesthesia.

The patient, aged twenty-four years, was given a preliminary injection of morphin, grain one-fourth, and atropin, grain one-one-hundredth, four hours before operation, which was repeated two hours later. At the time of the operation one-eighth grain morphin was given.

The site of the proposed incision was infiltrated with equal parts of ten per cent cocain solution and adrenalin. The subperiosteal infiltration was with one-half per cent cocain and adrenalin.

The practical points to be deduced from this case are:

1. That the radical mastoid operation can be done under local anesthesia without any pain.
2. That the superficial scalp tissues and periosteum are sensitive, but that bone has absolutely no sensation.

3. That the mucosa of the middle ear is extremely sensitive and must be separately cocaineized.
4. That irritation or destruction of the facial nerve is immediately noticeable to the patient.
5. That the after effects are practically nil.
6. That the end result is just as good under local as under general anesthesia.

Brown²³ states that the orthodox treatment of suppurative conditions of the middle ear is hopeless. His paper is mainly an exposition of the theories and opinions of Chas. Heath.

Kaufman²⁴ states that the Heath operation is justifiable and gives good results in:

1. Chronic mastoiditis where there is only partial destruction of the tympanic membrane and the ossicles are in position.
2. In cases of acute mastoiditis with an unusual amount of destruction of the tympanic membrane and loss of hearing.
3. In cases of acute mastoiditis with extensive necrosis of the bony portion of the external auditory canal.

On the contrary, it should never be attempted where there is cholesteatoma, and it should never be done until all non-surgical methods, including vaccines, have been tried.

Barnhill²⁵ mentions the following factors as influencing the end-results of the surgical treatment of chronic suppurative otitis media:

1. Age of patient.
2. Condition of nose, nasopharynx and pharynx.
3. Nature and violence of the original aural infection.
4. The presence of complications at the time surgical measures are attempted.
5. The period of the disease in which the operative attempt to cure is made.
6. Physical condition of patient.
7. Skill and judgment of the operator.
8. Efficiency of the after-treatment.
9. Cooperation of the patient, particularly after discharge from the hospital.

The author closes with a statement (a) as to the effect on the hearing, concerning which no improvement is expected; (b) as to cure of the suppuration, which occurs in ninety per

cent of cases; (c) as to mortality, which is greater from delay than from the operation itself.

Welton²⁶ discusses the indications and results in the radical mastoid operation. As to indications he mentions:

1. Persistence of pain in the ear or over the mastoid process. Permanent or intermittent attacks of vertigo, due to erosion of the external semicircular canal. Marked cerebral disturbance.

2. The existence of a fetid suppuration for a year or longer and when local treatment to the middle ear for a period of three months has failed to cure.

3. Frequently recurring middle ear suppuration with preceding malaise, slight or severe headache, temperature and mastoid tenderness.

4. Where the disease is not limited to the tympanum and where operation is prophylactic against fatal results coming without signs of pus retention or visible inflammation of mastoid.

5. Where pain and mastoid tenderness supervene upon cessation of discharge, to be relieved when pus begins to flow.

6. Chronic suppurative mastoiditis.

7. An onset of acute mastoiditis during the course of tympanic suppuration.

8. Fistula of mastoid bone.

9. Cholesteatomatous formation.

10. Labyrinthine vertigo in old healed suppurative cases.

11. Necrosis of bone shown by X-ray.

12. A sclerosing or rarefying osteitis where such condition produces periodic attacks of mastoid pain after all signs of active trouble in the ear have ceased.

13. A narrowing or complete stricture of the external auditory canal which would lead to pus retention.

14. Facial paralysis.

15. Tuberculosis causing the discharge.

16. Any intracranial or sinus involvement or the presence of an oncoming general septicemia.

17. Neuroretinitis or choked disc in a patient with chronic suppurative otitis media.

18. Where it is desired to take out life insurance.

19. In children when there is necrosis in both middle ear and mastoid cells.

20. Children from five years up, with two years' suppuration, in whom there is increasing deafness.

As to the results in the author's series of twenty-six cases he writes that the average time for after-treatment, or until complete cessation of all discharge, was sixty-seven days. Shortest time, eight days; the longest, four and one-half months.

The hearing was improved in thirteen cases.

No change in ten and an increase in deafness in three patients.

In one case a facial paralysis developed after operation, but this is clearing up. This occurred in a woman aged forty-two years, in whom the suppuration had been present intermittently for ten years following scarlet fever.

The general health, almost without exception, has improved.

As to length of time of the discharge prior to operation, it is stated that the shortest period was four years; the longest, sixteen years.

Considering the end-results in one hundred radical mastoid operations, Stucky²⁷ discusses (1) the chronic discharge, (2) the hearing, (3) the general condition of health.

In all the cases but eleven, there was complete cessation of the discharge of pus. In these eleven cases there was occasional recurrence of discharge of mucopurulent material from the lower tympanic cavity, the result of a patent or patulous eustachian tube. Nineteen cases reported a slight improvement in the hearing, while sixty cases reported the hearing neither better nor worse. Twenty-one cases were sure that the hearing in the operated ear was worse. All of the cases reported complete relief of all head symptoms and greatly improved health.

Blackwell²⁸ reports his results in four cases of his modified radical operation for chronic purulent otitis media. Three of the cases were dry and have been so from three to nine months. In three cases the hearing has been improved since operation; in the fourth case it has remained about the same. In dressing these cases it is most important to prevent a thick plug of granulations from developing in the attic and antrum

regions, as it easily becomes infected and serves as a constant source of infection to the entire wound. The most satisfactory method of preventing this is to remove all packing from the canal at the end of a week—even removing the cotton plugs from the meatus—permitting the atmospheric air to freely enter the interior of the wound.

In order to determine to what extent the radical mastoid operation succeeds in accomplishing what it is usually performed for, Harris²⁹ asks: (1) What is the radical operation? (2) When is it indicated? The answer is, "The radical operation, applied to the ear means, as elsewhere in the body, an operation for the radical or complete removal of all disease, and is indicated when cure by other measures is found impossible." From this basis the author has analyzed the results of the operation on twenty-four patients concerning the discharge, the hearing, the epidermization and the condition of the tube. Concerning the discharge, it was found that 48 per cent were perfectly dry and 52 per cent were still discharging. Concerning the hearing it was found improved in only 8 per cent, unchanged in 20 per cent, and worse in 20 per cent. Concerning epidermization the ear was found fully epidermized in fourteen cases, partly in three, while granulations were found in five. Two cases were still under treatment, though the operation in all had been performed not less than five months previous. The tube was found closed in eleven cases.

As the above statistics represent the work of approximately a dozen operators with large experience, the author feels that it is representative of the usual experience.

Two reasons are offered for the failures in so large a percentage of cases: (1) Failure in determining the proper indications for the operation, and (2) faulty technic in the operation or in the postoperative treatment. As a result of this investigation the author has drawn the following conclusions:

1. The radical operation is an operation of undoubted merit.

2. It has been in the past, and is today, being performed often when not called for.

3. The results are by no means uniformly good, partial or complete failures occurring in a considerable percentage of cases.

4. Improvement in the hearing cannot be promised. The most that can be offered, in the light of our statistics, is that the hearing will not be altered, although there is sufficient risk of lowering or destroying it to warrant reluctance or refusal to operate in case the hearing in the other ear is destroyed.

5. While accidents, including facial paralysis, are met with in the course of the operation, they are not of sufficient frequency or significance to have any bearing upon a decision in regard to the operation.

To close the long standing perforations in the tympanic membrane, Dunlap³⁰ has successfully used Okuneff's trichloroacetic acid method in fifteen cases. A ten per cent cocain solution was first applied and then the edge of the perforation was touched with a small probe wet with a saturated solution of trichloroacetic acid. All the cocain should be carefully wiped away before using the acid, as the two combine and form a white precipitate. The vitality of the drum membrane should regulate the frequency of cauterization after the scar tissue has been sufficiently destroyed to produce granulations. In some cases it was necessary to use weaker solutions of the acid, as the saturated solution destroyed the new tissue. When such is the case, the cauterization should be made at intervals of from five to seven days.

Allport³¹ reports a successful closure of a perforation by the above method.

Curtin³² closed a postaural fistula by making a new incision three-quarters of an inch behind the fistula. The periosteum and skin were freed from the bone from behind forward to the fistula by a thin elevator. The edges of the fistula were freshened and united by two sutures. The gap in the posterior incision was covered by skin graft.

Newhart³³ presents a case report of a primary carcinoma of the middle ear, adding an extensive review of the literature.

Burton³⁴ presents a case report of an epithelioma of the middle ear and mastoid.

Ryland³⁵ advises the routine employment of lumbar puncture in all cases of acute infective aural disease upon which it has been decided to operate:

1. Because it is highly desirable to know (previous to any

operation upon aural disease which falls into that class of case under consideration) whether or not the spinal fluid is turbid.

2. Because, in certain instances, the tissue reactions fail, and the middle ear infection proceeds with great rapidity to an intracranial and meningeal infection.

3. Because it is probable that a certain proportion of these cases which begin to manifest signs of meningitis after an aural operation have been in reality cases of meningeal infection for hours, or even days, before an operation was performed.

4. Because lumbar puncture as a routine procedure would do much to establish the frequency of occurrence, and to inform us as to the type of case in which we are to expect occurrence of the condition known as meningitis serosa.

5. Because the procedure would afford a safeguard of some value to the reputation of the operator.

VII.—Intracranial Complications.

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Blackwell¹ presents the following conclusions from his study of thirty-five cases of perisinus and extradural mastoid abscess:

1. None of the patients showed any characteristic symptoms indicating the presence of a perisinus or extradural abscess.

2. All of the cases on aural examination exhibited the well known local clinical objective signs which would indicate to a trained observer the necessity for a mastoid operation.

3. X-ray examination cannot in all cases be relied upon to reveal the presence of an extradural or perisinus abscess.

4. In this series the complication occurred very largely in acute mastoiditis, of three or four weeks' standing, in young people of fifteen to thirty, and was associated with slight temperature reaction.

5. If operation be performed, the prognosis is good.

6. Accidental injury to the sinus, occurring during operation in perisinus and extradural abscess, renders the prognosis

serious. The only death in these thirty-five cases followed an injury to the sinus.

7. Finally, the complete mastoid operation, together with its after-treatment, results in the most rapid and satisfactory healing and in improved cosmetic appearance.

Calhoun² reports a case of epidural abscess over tegmen of antrum and middle ear which gave all the symptoms of brain abscess. The radical mastoid operation with exposure of the affected area resulted in cure.

Stone³ reports an unusual case of sinus phlebitis and discusses some diagnostic tests:

The unusual case reported by the author was that of a boy four and a half years old, in whom the presence of a sinus phlebitis was not recognized until there were undoubted symptoms of general sepsis, because of the total absence of any sign of ear or mastoid involvement. At the first examination, when the only symptom was vomiting, there was noticed a glandular swelling in the posterior triangle of the neck. A diagnosis of acute gastric indigestion was made. Three days later elevation of temperature was first recorded, and the patient was dull and photophobic. One week after the onset of the vomiting, the picture was that of a meningitis, and a lumbar puncture was made. Headache did not appear until the following day, and in the region of the swollen glands there was a puffy edema. On the next day the patient had a chill; temperature, 105 degrees. The swelling in the neck had extended upward over the base of the skull, reaching from the occipital protuberance to the mastoid. Just posterior to the mastoid, over the region of the emissary vein, there was considerable tenderness. An incision was made slightly posterior to the usual mastoid incision and extending downward over the swelling in the posterior triangle. Free pus was found in the latter region, and the bone over the sinus was found to be soft and necrotic. The mastoid cells and antrum were normal, with the exception of a few cells overlying the sinus. The sinus contained a clot, which was removed, but no free bleeding was obtained from the region of the bulb. The jugular vein, however, was not touched, as the condition of the patient was too serious. The patient died thirty-eight hours later.

After discussing the importance and difficulty in making a diagnosis of sinus phlebitis before onset of the complications of general sepsis or brain abscess, the author reviews the various tests supposed to determine any interference with the normal flow of blood through the sinus. They are:

1. The West-Beck symptom, which consists in the production of distension of the veins of the forehead and the fundus oculi on compression of the jugular opposite to the suspected lesion. The author considers this test almost worthless, as the effect is so transient and its recognition so dependent upon the personal equation of the observer.

2. Greisengers' symptom—i. e., swelling over the emissary vein of the mastoid. The author quotes authorities who state that in reality the puffiness over the emissary vein region is not a sign of venous obstruction, but is due directly to the presence of pus under the periosteum, and is therefore a late symptom, hence this also is an unreliable sign.

3. The recognition of a clot in the jugular on deep palpation over the vein. However, the danger of dislodging the clot and causing immediate death thereby, renders this test a very hazardous one.

4. Blood counts and blood cultures are of assistance in excluding other possibilities. A blood count is of aid in ruling out typhoid and malaria. The advantages of blood culture are thus set forth:

- (a) With few exceptions, uncomplicated mastoid infections give negative blood cultures.

- (b) With few exceptions sinus infections give positive blood cultures at some time during their course.

- (c) The absence of bacteria in doubtful cases would lead one to hesitate to explore until the possibility of all intercurrent disease had been excluded. As regards treatment, the author favors exploration in doubtful cases, and should a clot be demonstrated, he favors preliminary ligation of the jugular vein in preference to resection.

Haeggstrom⁴ reports a case of scarlatinal mastoiditis, in a girl seven years old, with arrosion of the sinus wall on the sixth day after a mastoid operation, with a fatal termination. Autopsy revealed an opening, the size of a pea, in the wall of the sinus where it had been exposed at the operation.

McCoy⁵ reports a case in which suppuration from the jugular bulb persisted after the sinus operation and resection of the jugular vein. For this condition, the Tandler operation was selected as giving the easiest, simplest and safest method of reaching the bulb, and as most skillfully avoiding danger of wounding the surrounding vital structures. The steps of the operation are:

1. The mastoid incision and the incision for the jugular are converted into one. The sternomastoid muscle is separated for its entire length and pushed posteriorly.

2. The spinal accessory nerve is loosely tied with a suture, so that it may be in good view during the operation. The nerve is followed almost to its exit at the jugular foramen.

3. Passing the finger deeply into the wound, the space between the styloid process and the mastoid process is found, where the exit of the facial nerve through the stylomastoid foramen may be exposed.

4. The digastric muscle is separated from the digastric fossa and shoved forward and downward. By working on a line below the stylomastoid foramen and this muscle there will be no danger of injuring the facial nerve.

5. After pushing aside the digastric, the occipital artery may be ligated in two places and cut.

6. The jugular vein may now be separated from the margin of the jugular foramen, which can be felt with the finger. After pushing aside the periosteum at the base of the skull and the rectus capitis lateralis, the uppermost portion of the vein may be loosened.

7. The bone is now removed from the sigmoid sinus to the bony margin of the jugular foramen, and the sinus bulb and vein are split wide open.

Long⁶ reports a case of acute suppurating mastoiditis without tympanitis, with the complications of perisinus abscess, phlebitis and streptococcemia, with recovery following operation. The interesting features were:

1. The mildness of the primary infection—rhinitis.

2. The transmission of such virulent bacteria as streptococci from the nose to the mastoid cells without injury to any of the structures met during the journey.

3. The six days of severe pain and tenderness over the

mastoid region, then an abrupt cessation, due to a breaking through the mastoid boundary into the extradural space.

4. The extensive necrosis of the mastoid found at operation five days later.

5. The fact that no thrombus was found in the sinus, even in the presence of the classical symptoms of sinus thrombosis.

6. The uselessness of nasal douches and sprays as a prophylaxis of ear infection.

7. The tardiness in operating, due to absence of tympanic symptoms.

8. The slow convalescence, the patient having left the hospital twenty-three days after the operation.

Odeneal⁷ reports two cases of mastoiditis with fistulæ leading to the sinus, and in one case with the presence of thrombosis, in the other with a normal sinus, but in both no symptoms leading one to suspect such an extension of the disease process as was found. These two cases illustrate how utterly impossible it is to always judge of the extent of a mastoiditis from a symptomatic standpoint.

Lewis⁸ reports a case of lateral sinus thrombosis, complicating an acute exacerbation of a chronic suppurating ear. The patient had been treated for malaria by a general practitioner. When operation was finally begun, and the periosteum was being elevated, there occurred a profuse hemorrhage from the middle ear, which later was found to be due to a rupture of the walls of the sinus above the thrombus. All the bony walls of the mastoid covering dura and sinus had disappeared. Patient finally succumbed from septicemia. The author draws attention to the mild nature of both the objective and subjective symptoms attending so much mastoid necrosis, together with an immense epidural abscess and extensive sinus thrombosis, and the absence of metastatic foci of infection during the whole three and one-half weeks of its course.

Glogau⁹ details a case which at the primary mastoid operation presented a perisinus abscess with apparently normal sinus wall. During the next few days there developed the septic fever curve, with chills and sweating, characteristic of sinus thrombosis, with negative blood cultures, although the pus from the mastoid showed pure streptococci. A week after the first operation, a second operation was performed and a

clot removed from the sinus after resection of the jugular vein, which was found thrombosed with inflammatory hypertrophy of the cervical lymph glands, although there were no changes around the neck pointing to this condition prior to the operation. After the jugular resection the sinus and bulb were laid open. Metastatic abscesses developed later but the patient eventually recovered.

Patton¹⁰ reports a cerebral complication suggestive of brain abscess which developed thirteen hours after the initial pain of an acute otitis media and three hours after the ear first began to discharge. In spite of brain explorations at two operations, during which nine punctures into the cerebral substance were made, no pus was found, but after each operation cerebral symptoms improved. Two weeks after the last exploration pus came from the wound for the first time. The author asks in what way if not by an abscess can the symptoms be accounted for? But no pus was found. Could the abscess have worked its way out through one of the incisions?

Coates¹¹ observed three cases of brain abscess of otitic origin, in only one of which was there any paralysis apparent, and this came on late in the disease. Neither were the mental symptoms more conclusive or helpful in establishing the diagnosis. In two of the cases the febrile reaction was marked; the pulse rate was rapid, at least commensurate with the temperature, as were also the respirations. With wakefulness and delirium rather than slow cerebration, and mental alertness instead of drowsiness, the absence of eye pressure symptoms or of paralysis, and in two of the three cases a concomitant meningitis existing, the diagnosis of a brain abscess was a difficult task.

Bernstein¹² reports two cases of cerebellar disease, one of which was an abscess complicating suppurative otitis media. The well known tests are mentioned, and particular emphasis is laid on the work of Jones of Philadelphia.

Clothier¹³ cites a fatal case of pneumococcic meningitis developing less than a week after an acute suppurative otitis media. During the entire course of the disease there were no signs of mastoid involvement, and the patient died before consent for the mastoid operation was obtained. Pneumococci were found in the aural secretion and in the spinal fluid.

Ryland¹⁴ reports a case of acute mastoiditis engrafted on a chronic suppurative otitis media, in which a perisinus abscess, and phlebitis of the lateral sinus wall were discovered, but, as the appearances were not in favor of an intrasinus clot, it was not disturbed. A little over a month later there were evidences of meningeal involvement. Lumbar puncture was performed three times in four days, a streptococcus was found, but patient recovered.

McKenzie¹⁵ advocates the use of an artificial cerebrospinal fluid for purposes of lavage in cases of otitic meningitis. The formula is:

Potassium chlorid	3.5
Sodium chlorid	1.5
Potassium carbonate.....	0.2
Glucose	2.0
Distilled water.....	100.0

This forms a stock solution, from which the fluid for use (specific gravity, 1002) is made up as follows:

Stock solution	10
Sterile distilled water.....	90

The salts should be dissolved in water and the solution boiled before the glucose is added, as boiling decomposes the glucose.

Syme's¹⁶ case presents the following interesting features:

1. The bone condition appears to have been an acute spreading osteomyelitis originating in an acute affection of the tympanum.

2. The sinus became infected probably by way of a communicating vein, as the wall contiguous to the bone was quite healthy.

3. Cerebrospinal fluid could be seen flowing into the sinus.

Maclay¹⁷ narrates a case of sinus thrombosis, following a blow on the ear. The explanation given is that the emissary vein was probably ruptured by the blow and thrombosis started in the sinus, which subsequently became infected from the diseased mastoid. Maclay¹⁷ also reports a case of temporo-sphenoidal abscess which was operated, and the patient was dressed and moving about the ward at the end of three weeks.

Ryland¹⁸ reports three cases of lateral sinus disease. The

points of interest in the first case were (a) the extradural abscess over the sigmoid sinus had made so much pressure as to force out all the contents of the sinus at this point, leaving a concave anterior wall against the posterior wall of the sinus. (b) In spite of the fact that the clot was not entirely removed from the torcular end of the sinus, the patient recovered. The interesting feature of the second case is the illustration of the fact that the course taken by acute infective disease of the middle ear tract may be, and nearly always is, much more dependent upon anatomic dispositions than upon the nature and virulence of the infection. The last case presented the following points:

(a) The involvement of the sinus after an initial operation that appeared at the time to provide a very free drainage.

(b) The virulent pneumococcal infection of the middle ear tract and finally of the subarachnoid system.

(c) The clear and complete perforation of the sinus wall.

VIII.—Diseases of the Internal Ear.

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Shambaugh¹ draws attention to the fact that focal infection plays a rôle in the primary degenerations of the labyrinth, and reports four cases in which the tonsils were the seat of infection, from which the trouble originated. Three distinct types may be observed:

1. Where the cochlea alone is involved, producing nerve deafness and more or less tinnitus.
2. Where the vestibule is involved simultaneously with the cochlea, producing, as a rule, occasional attacks of vertigo in addition to the symptoms arising from disease of the cochlea.
3. Where the vestibular nerve alone is affected, and where all symptoms indicating disease of the labyrinth may be absent, except for possible occasional attacks of vertigo.

Yearsley² also discusses the question of the systemic infection of the internal ear of focal origin in such cases characterized by sudden attacks of aural vertigo, with or without deafness, as well as in such cases of nerve deafness, with or without tinnitus. These cases are differentiated from those of true Ménière's disease, in which the cause is a hemorrhage or effusion into the labyrinth. As probable sources of the infection, the tonsils, nasal fossæ, teeth and intestines are mentioned. Four cases illustrating this etiologic relationship are described.

Stein³ discusses the significance of sudden and profound deafness, not such types of deafness that present slight or only partial impairment of hearing, although possibly taking place suddenly, nor to such cases in which profound or absolute deafness ensues gradually from chronic changes in or about the hearing apparatus. The following conditions are mentioned as causing profound deafness, apparently suddenly:

1. Bleeding in the middle ear in a case of pernicious anemia.

2. Hemorrhagic effusions into the labyrinth.
3. Syphilis of labyrinth, eighth nerve or brain centers.
4. Diffuse labyrinthitis.

Graham,⁴ in discussing the cases of neuritis of the eighth nerve, refers to the multiplicity in the causes and in the variation of the symptoms. As etiologic factors are mentioned:

1. Pressure as from a tumor.
2. Serous meningitis from middle ear infection.
3. The effect of suppurative processes at the apex of the petrous portion of the temporal bone.
4. Toxemia from lues, lead, arsenic, alcohol and tobacco or from intestines.
5. Arteriosclerosis, heart lesions and nerve exhaustion.

This group of cases exhibits a partial or total, temporary or permanent, deafness which has a tendency to recurrence, during which the functional testing may give anything from a middle ear disturbance to that of the typical lesion of the internal ear. Accompanying this may be an apoplectiform disturbance of the vestibular apparatus, as exhibited by dizziness and disturbances of equilibrium, inequalities in the after-turning nystagmus, caloric and galvanic reactions, and interference with the kinesthetic sense. Either the cochlear or the vestibular symptoms may be uppermost, or one apparatus or the other affected separately, making the lesion as a whole overlooked or referred to other parts of the body, as is often the case when the patient is superficially examined. Nine cases are reported to illustrate the above contentions.

As to the diagnosis of serous labyrinthitis, Graham⁵ states that, with the exception of the fistula symptom, which is positive, there may be all the signs of a diffuse suppurative labyrinthitis. Where the fistula or other tests cannot be made, for fear of breaking down protective barriers, or where a diagnosis may not be made because of deafness and a nonreactive labyrinth, the clinical course would be the only guide. As long as there is no headache, and the fever ranges between 98.6 and 99.6, and the pulse remains around normal, and there is no marked variation in the blood picture, it is safe to let the patient alone. But should the temperature and pulse rise rapidly, accompanied by a marked headache, and the dizziness takes on a stormy character with vomiting, so that the

patient is unwilling to be moved at all, the labyrinth must be sacrificed and drainage established, even as far as the internal canal.

Two case reports are added.

In reference to the treatment of labyrinthine infections, Phillips⁶ states that the indications for operation depend upon the type of labyrinthine involvement, and that some of the conflicting opinions are due to the difficulties in satisfactorily determining the type present. Except in cases that already show that the infection has passed through the labyrinthine spaces into the meninges, the author feels that a moderate degree of conservation should rule the action of the surgeon.

Nonsuppurative cases resulting from parotiditis, hemorrhage or other effusions, and epidemic cerebrospinal meningitis should never be subjected to operation. The labyrinth should not be operated upon in cases of serous labyrinthitis, and whenever any doubt exists as to whether the case is purulent or serous in character, the patient should be given the benefit of the doubt and the operation delayed, pending further developments. The acute diffuse labyrinthitis developing in chronic suppurative cases offer more hope of becoming circumscribed than when accompanying acute purulent otitis media. As the infection in these latter cases usually extends rapidly to the meninges, early surgical measures seem to be justified. Even when the meninges have become involved, there is still hope from prompt operative measures. The author reports a recovery from such a complication, stating that the Neumann operation is the ideal procedure. The paralabyrinthitis cases should be subjected to the mastoid operation, in order to prevent further erosion of the labyrinthine capsule. The circumscribed type of labyrinthitis should be subjected to the mastoid operation, but the intact membranous labyrinth should not be disturbed. Necrotic areas should be removed, but the operator should not go beyond the lines of demarcation.

In a later paper Phillips⁷ goes more into detail concerning classification, but his principles of treatment remain the same. He adds a word, however, concerning cases of latent labyrinthitis, where the radical mastoid operation is indicated *per se*. He advises that the radical mastoid operation should not

be performed in these cases of latent labyrinthitis without immediate exenteration of the labyrinth, because the shock which occurs during the performance of the mastoid operation is sufficient to light up a dormant process, which usually starts a meningitis or cerebellar abscess. As to classification, the author adds a new nomenclature for the serous and purulent types, calling them, respectively, mild and grave labyrinthitis.

The acute diffuse labyrinthitis complicating acute purulent otitis media, may be of two varieties: one occurring within the first three days of the middle ear inflammation, which is usually mild and does not extend to the meninges; the other, occurring six to ten weeks after the onset of the acute otitis media, and meningitis is a common and fatal complication.

In the acute stage of labyrinthitis, Kerrison⁸ advocates absolute rest in bed, as little local treatment as possible, and the avoidance or postponement of all bone surgery not otherwise imperatively indicated. In the quiescent, or latent stage, a radical operation, combined with careful surgical drainage of the labyrinth, is the only safe treatment. In each individual case surgical treatment must take account of the following points:

- (1) Immediate chances of recovery, with and without operation.
- (2) Possible influences of any operation in causing a spread of infection.
- (3) Stage of the disease in which operative intervention is safest.
- (4) Ultimate risk to life if the labyrinthine focus of infection is not surgically eliminated.

Rae⁹ presents a new classification for diseases of the labyrinth as follows:

1. Acute diffuse labyrinthitis. No distinction is made between serous and purulent, as in the very earliest stages these forms cannot be differentiated—in fact, the serous variety is very likely the first stage of the purulent, and, at best, the differential diagnosis is made on the results and not on the evidence.

2. Chronic diffuse labyrinthitis. This is the type formerly called latent, in contradistinction to the first or acute type, formerly called manifest.

3. Paralabyrinthitis—formerly the circumscribed: (a) With fistula; (b) without demonstrable fistula.

In discussing the differential diagnosis between purulent labyrinthitis and cerebellar lesions, Friesner¹⁰ mentions the following points:

1. Headaches, very rarely present in uncomplicated labyrinthitis, are invariably present in cerebellar lesions.

2. With cerebellar lesions there may be disturbance of the sensorium, disturbance of respiration, bradycardia, optic nerve changes, paralysis of cranial nerves, none of which, with the exception of disturbances in the eighth nerve and occasionally in the seventh, ever occur with labyrinthitis.

3. Vomiting, while present in both, is never projectile in type when due to labyrinthine disturbance, but always associated with nausea.

4. There is never much elevation of temperature in uncomplicated purulent labyrinthitis.

5. The spinal fluid is normal in uncomplicated labyrinthitis.

6. With cerebellar lesions there may be hypermetria, asynergy, adiadokokinesis, tremor, disturbances in speech, atony or hypotony, catalepsy, hemiparesis, and fixed attitude of head. None of these occur with labyrinthitis.

7. As to the falling phenomena, the direction of falling is changed according to the position of the head—i. e., always toward the direction of the slow component, when of labyrinthine origin; direction of falling unchanged in cerebellar disease.

8. Deviation of extremities, past-pointing, has the same significance as falling.

9. In labyrinthine suppuration there is loss of hearing, loss of reaction to caloric, rotation, and fistula tests, etc. In cerebellar disease there is "enduring nystagmus."

10. Nystagmus, if vertical, points to cerebellar disease; otherwise it has localizing significance.

Rott¹¹ details the indications for the labyrinth operation. After citing in chronologic sequence the various opinions held on this subject by a representative body of otologists during the past decade, the author classifies these opinions as follows:

(a) Ultraradical, when the labyrinth operation was advised

as soon as any form of labyrinthitis was diagnosed. Jansen was the exponent of this view.

(b) Radical, when the labyrinth operation was advised during the acute stage of diffuse suppurative labyrinthitis, as soon as the diagnosis was made, without waiting for evidences of meningeal involvement. Those who subscribed to this view were Freytag, Hinsberg, Bárány, Neumann, Ruttin, Urbantschitsch, Ballenger, Mackenzie, Whiting, Braun and Friesner, Dighton, Leidler, Perkins, and Campbell.

(c) Conservative, when the labyrinth operation was advised only when meningitis is threatened or present. Those holding this attitude are Dench, Uffenorde, Bárány, Kopetzky, Alexander, Kerrison, Shambaugh, Duel, Henninger, Danziger, Saunders, Phillips, and Broder.

(d) Ultraconservative, when no labyrinth operation was permitted during the acute stage. Blackwell is the exponent of this view.

Another interesting phase of the subject, and one which apparently has not been definitely settled, is the question as to the advisability of performing the radical mastoid operation in the presence of an acute diffuse labyrinthitis, without at the same time opening the labyrinth.

While the consensus of opinion, which in some instances is quite dogmatically expressed, is opposed to the practice of performing the mastoid operation in these cases without at the same time opening the labyrinth, because of the danger of setting up a fatal meningitis, there are a few men who throw the weight of their authority in favor of such a practice in certain instances.

Those who condemn this practice are: Hinsberg, Davis, Bárány, Alexander, Kerrison, Ruttin, Mackenzie, Brock, Whiting, Braun and Friesner, Ballenger, and Dighton.

Those who favor the practice under certain conditions are Burger, Duel, Dench and Broder.

Duel thinks it is all right in acute otitis cases, providing all concussion is avoided; and Dench states that the single operation is justified if the labyrinthitis is latent and there are no labyrinth symptoms.

Concerning the question of the danger of accidental dislocation of the stapes during the radical mastoid operation and

the bearing of this accident on the indication for opening the labyrinth, only three authors express themselves, namely, Hinsberg, Alexander and Kerrison. Hinsberg and Alexander advise immediate operation on the labyrinth in cases of labyrinthitis following operative trauma, while Kerrison goes one step further and advises the labyrinth operation as soon as the accident has been done, before the labyrinthitis develops. The reason given in each case is that the labyrinthitis which follows this accident usually gives rise to a fatal meningitis.

As to the course of procedure in the circumscribed variety, the consensus of opinion is in favor of the principle of non-operative interference on the labyrinth, excepting, of course, the ultraradical views of Jansen, who operates all cases, whether circumscribed or diffuse. However, Bárány, Neumann and Ballenger state that they would deem the labyrinth operation in circumscribed labyrinthitis justifiable, when the irritable labyrinth continued to give rise to periods of intense vertigo, as to incapacitate the patient from work. Here, particularly if the hearing in the other ear is good, destruction of the irritable labyrinth is advised.

From the study of the literature the author offers the following conclusions relative to the indications for operative interference on the labyrinth:

1. In acute diffuse suppurative labyrinthitis, the only time a labyrinth operation should be considered is when symptoms of meningeal involvement supervene upon those of the labyrinthine infection.

2. In any other type of diffuse labyrinthitis, no labyrinth operation, because of the labyrinthine condition *per se*, should be performed. If, however, the middle ear suppuration is of such a type as to present indications for the radical mastoid operation, then the radical mastoid operation should be immediately followed by the labyrinth operation.

3. The only conditions presenting labyrinth symptoms in which the mastoid operation alone is indicated are: (a) that condition of perilabyrinthitis in which the labyrinth itself has not yet become involved, and (b) the circumscribed variety of labyrinthitis, with the exception of those cases which continue to give rise to incapacitating symptoms of vertigo and

in which hearing in the other ear is good. In this condition the labyrinth operation is indicated.

4. Should the stapes be dislocated accidentally during the radical mastoid operation, or should appearances of the labyrinth capsule (as pus exuding from oval window) at this time first draw our attention to the possibility of a labyrinthitis, then the safer course would be to open the labyrinth at once.

Critically reviewing the various tests for determining the functional activity of the internal ear, in suppurative labyrinthitis, Duel¹² states that only two are necessary, namely, the caloric test for the static apparatus and the noise apparatus for the cochlea. All other tests, such as the turning, the galvanic and the fistula tests, are condemned as being indefinite if not absolutely harmful. No information can be obtained from these latter to assist in determining the necessity for surgical interference that cannot be more safely and more satisfactorily obtained from the former. The author condemns the routine use of all tests at our disposal simply to elicit phenomena which we know beforehand will be present. Nothing but harm to the patient may result and hence their use is discouraged.

Auerbach¹³ reports a case of labyrinthine fistula with complete loss of cochlear function and persistence of normal vestibular function. The interesting features are:

1. The practically normal vestibular reaction, showing neither an increased nor a diminished static activity.

2. Complete loss of cochlear function, indicating a widespread invasion of the labyrinth in the past.

3. Question of treatment. This patient was seen by several otologists, who advised a radical mastoid operation. Was this advice justified in the light of the findings?

4. A dry ear with no spontaneous nystagmus, no dizziness, no loss of hearing, seems to call for no operative interference.

5. With a recurrent acute infection of the middle ear causing retention, dizziness, spontaneous nystagmus, and disturbance of equilibrium, a radical mastoid would be in order. In no case should a labyrinth operation be considered, unless intracranial complications were threatened or manifest.

IX.—Injuries.

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3. Fraser, J. S.: Injuries of the Middle and Inner Ear in Fracture of the Cranial Base. *Proc. Roy. Soc. Med.*, Sec. Otol., 1917—X—20.
4. Keeler, J. C.: Fracture of the Tympanic Plate of the Temporal Bone. *Laryngoscope*, 1917, 27-192.
5. Marriage, H. J.: War Injuries and Neuroses of Otological Interest. *J. Laryngol.*, Lond., 1917—XXXII—177.
6. Yearsley, M.: An Air Raid Case. *J. Laryngol.*, Lond., 1917—XXXII—273.
7. Bryant, W. Schier: Prevalence of Ear Injuries and Diseases in the French Army. *J. Laryngol.*, Lond., 1917—XXXII—338.
8. Fraser, J. S., and Fraser, John: The Morbid Anatomy of War Injuries of the Ear. *J. Laryngol.*, Lond., 1917—XXXII—340 and 369.

Wilson¹ concludes that exposure to high explosives may produce rupture of the drum, and that this rupture tends in most cases to spontaneous closure, but there may also be concussion of the internal ear with nerve deafness and equilibrium disturbances, with or without rupture. The concussion may pass off, leaving an injured nerve mechanism demonstrable by (a) nerve deafness of a varying degree, and (b) a defect of equilibrium. Best results are obtained by leaving the blood clot over the perforation intact, and by keeping the patient in bed at least ten days to allow the effects of the concussion to subside. High explosives may cause a definite injury to the ear and its central connections.

Shuter² discusses the war injuries to the external, middle and internal ear. Of particular importance is his theory of the causation of concussion deafness, which he maintains is due to a disturbance of the middle ear structures, from dynamic waves, rather than a lesion of the internal ear from sound waves.

Fraser³ reviewing the injuries of the middle and internal ear in fractures of the cranial base, states that the direction of

the line of fracture may run parallel to the long axis of the petrous bone or at right angles to the long axis.

(1) Longitudinal fractures as a rule start in the orbit or region of the sella turcica, and pass backwards along the line of the middle ear cleft, breaking the roof of the eustachian tube and tympanic cavity. The fracture may then pass outwards to the external meatus and squamous region; if this is the case the inner ear is not involved, though the ossicles may be dislocated and the drumhead torn. On the other hand, the fracture, after reaching the roof of the tympanic cavity, may pass inwards through the petrous pyramid, and thus resemble in some respects those fractures which run at right angles to the long axis of the petrous bone. The inner ear is, of course, involved in these latter cases. (The author reports a case belonging to this type.)

(2) Genuine transverse fractures of the petrous pyramid run at right angles to the long axis of the pyramid and always injure the labyrinth. As a rule the fracture passes through the external meatus, roof of the tympanic cavity, vestibule and internal auditory meatus, as this is the line of least resistance. The fracture may, however, pass further forward through the cochlea, or further back when the canals are involved.

If the patient survives the injury at the time he is not out of danger, as meningitis may supervene as the result of infection from the middle ear spaces, or of contamination of the blood in the external meatus and tympanic cavity. Such a complication is more likely if the labyrinth is involved in the fracture.

The author adds two detailed case reports with postmortem findings, both gross and microscopical.

Keeler¹ reports a case of fracture of the tympanic plate of the temporal bone, from a fall on the chin, causing bleeding from the left ear for forty-eight hours, at first profuse, then gradually subsiding. Five weeks after the accident, examination revealed pus in left auditory canal, tympanic membrane lacerated, and an irregular inflamed elevation on the floor of the canal, obstructing half its lumen. There was distressing tinnitus and loss of aerial conduction and Weber laterated to the injured side. Treatment cured the infection and restored

the hearing. The X-ray revealed the fracture of the tympanic plate with upward displacement.

Marriage⁵ discusses (1) injuries of the auricle and external meatus, (2) injuries of the middle ear, (3) injuries of the internal ear, which are divided into (a) direct injury of the labyrinth by a missile, (b) indirect injury of the labyrinth in fracture of skull, (c) concussion deafness, and (4) psychic deafness. Case reports illustrative of these various types are added.

Yearsley⁶ reports an injury from a loud explosion, in which the trouble was due to an acute depression of the tympanic membranes, without any signs of labyrinthine involvement.

Bryant⁷ calls attention to the prevalence of ear injuries in the French army, having found 16 per cent of ear cases, of the total sick in the evacuation hospitals in the Zone des Armees at the Front. From the evacuation hospitals $4\frac{1}{2}$ per cent of ear cases are evacuated to the rear. In the rear of the Zone des Armees, in the Zone des Etapes, ear cases form $6\frac{1}{4}$ per cent of total sick. Of these 7 per cent are evacuated to the rear. The nature of the injuries and complications are divided into three categories:

1. Rupture of tympanic membranes.
2. Complications of ruptured tympani; (a) suppuration of middle ears, acute and chronic; (b) mastoiditis, mastoid abscess and its complications.
3. Commotion of the eighth cranial nerve apparatus (the cochlear branches always suffer, the vestibular branches less frequently): (a) Sudden onset; (b) gradual onset.

In closing, the author draws attention to the fact that with the English speaking Allies the organization of the otolaryngologic service is the weakest, whereas the best possible organization is needed because of the loss of industrial capacity and consequent increase of pension potentiality of these cases.

Fraser and Fraser⁸ contribute an instructive report on war injuries from the point of view of morbid anatomy. Six cases were examined:

Case 1. Direct injury by shrapnel.

Case 2. Indirect injury of the ear, due to bullet wound.

Case 3. Shell deafness.

Case 4. Injury to the ear due to the bursting of a rifle grenade.

Case 5. Shell explosion.

Case 6. Injury by high explosive shell.

The only changes of importance found in the four cases of "explosion" injury of the ear are:

1. Rupture of the drumhead and hemorrhage into the middle ear spaces.

2. Hemorrhage in the fundus of the internal meatus in three of the four cases.

No change in the neuroepithelial structures of the labyrinth could be discerned, the authors thus being led to the belief that many cases of shell or explosion deafness are functional. On the other hand, rupture of the drumhead and hemorrhage into the middle ear spaces must cause a certain loss of hearing; while hemorrhage in the fundus of the internal meatus may give rise to deafness, tinnitus, giddiness and other symptoms of an inner ear lesion. It may be that the "blow" to the ear due to shell explosion, and the associated loud sound, paralyzes the delicate nerve endings of the auditory apparatus, but this has not been demonstrated microscopically.

X.—Instruments.

REFERENCES.

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2. Hurd, L. M.: A Method of Medicating Eustachian Bougies. *Laryngoscope*, St. Louis, 1917—XXVII—879.
3. Hagemann, J. A.: An Improved Aural Curette. *Laryngoscope*, St. Louis, 1917—XXVII—52.
4. Holmgren: Re-education of the Ear by the Kinesiphone. *Hygeia*, 1917—LXXIX—1.
5. Lubman, Max: An Electrical Noise Apparatus. *Laryngoscope*, St. Louis, 1917—XXVII—512.

Baum¹ has devised an artificial ear drum to be used in cases of defective hearing and for the prevention of concussion deafness. The material is a fine grade of oiled silk. In its finished form it is suspended perpendicularly concaved, and retained in this position by four roll-like folds in continuity, with multiple cornucopial or cone-shaped sound accumulators,

in which the outer or distal expanded openings are largest, gradually diminishing their lumen toward their approximal ends with smaller openings into an expanded or ampulla-like cavity in front of the artificial drum. The continuation of the outer folds of the accumulators expands outwardly with another roll-like fold continuous with the perpendicular circular surface diaphragm or artificial drums, approximating the natural drum or membrana tympani. The outer roll-like surfaces of the megaphone appendages afford a cushion-like contact with the canal walls, conforming with and permitting an easy and flexible support to the perpendicular surface diaphragm or artificial drum. The formation of these roll-like appendages is such as to afford ample intervening space for ventilation and drainage, and for sustaining the membrana tympani while the artificial drum holds it in position. Illustrations with description for making this device accompany the article. Twenty case reports are added:

Hurd² has devised a method of medicating eustachian bougies. Celluloid bougies are used, which are coated with silver nitrate, using gum acacia as a base. His method is as follows:

To a saturated solution of gum acacia in a water bath, using a test tube, add silver nitrate solution, using one-tenth per cent strength of silver as desired. The bougie is dipped about one and one-half inches into this solution, and when the bougie has a uniform coating, it is placed to dry. After this a second coating is given.

It is better to use them the second or third day after preparation.

Hagemann³ has devised an aural curette, an aural hook and tympanum perforator.

Holmgren⁴ reports some success in the treatment of deafness, by means of the kinesiphone, but regards this instrument as but a feeble addition to the aurist's armamentarium. The best results are obtained in dry catarrh of the middle ear and in the condition following suppurative otitis media.

The apparatus presented by Lubman⁵ for testing unilateral deafness consists of two magnetos, two coils and a vibrator set in a nickel case with a fiber base, and operated by a small vest pocket battery, easily procurable at any electric supply

store. The instrument does not have an ear piece as Bárány's, but is applied directly over the ear of the patient and thereby excludes any transmission of sound through the bone of the ear.

XI.—Educational Methods for the Deaf.

REFERENCES.

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2. Yearsley, M.: The Causation and Prevention of Educational Deafness. *J. Laryngol.*, Lond., 1917—XXXII—117 and 145.

Goldstein¹ announces the creation of a new society to advance the educational measures of interest to the deaf along purely oral principles. Its membership is open to anyone interested in the oral education of the deaf.

Yearsley² discusses the causation and prevention of educational deafness, meaning by "educational deafness" that degree of loss of hearing which prevents a child from obtaining the full benefit of ordinary education in an elementary hearing school, and necessitating his being taught in a special deaf school or "hard of hearing" center. The article is very comprehensive in scope. After discussing the various causes of congenital cases (consanguinity, illegitimacy and syphilis) and acquired cases (the infectious diseases, diseases of the nervous system, primary ear disease, middle ear catarrh, and suppuration and injury), the author discusses the prevention of infection of the nasopharynx, its proper treatment when finally present, and lastly the treatment of the ear condition itself.

404 Paulsen Bldg.

XLIII.

ABSCESS OF THE LEFT FRONTAL LOBE FOLLOWING SUPPURATION OF THE FRONTAL SINUS; REPORT OF A CASE AND EXHIBITION OF SPECIMEN.*

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Mr. K., age twenty-three years, first consulted me on November 5, 1917, complaining of pain over right frontal region, said he had taken cold four days previous and this pain was the result. He also volunteered the information that his father had always suffered from the same type of neuralgic headaches as he had.

Examination showed both nasal cavities to be very free, no unusual hypertrophies of the turbinates and a moderately straight septum; mucous membrane congested and swollen, especially over the right middle turbinate; thick yellow pus coming from the nasofrontal duct on the right side, flowing down over the middle turbinate.

The region of the duct and middle turbinate was shrunk with cocain and suction applied, this giving relief from pain. The patient was seen daily, the pain returning each morning and being relieved after treatment. On the fourth day, November 9th, he complained of some pain over the left frontal region, but not as bad as over the right, and pus was seen flowing down over the left middle turbinate and from the left nasofrontal duct. The same treatment was applied to the left side. Patient was seen daily for thirteen days. At no time was the pain severe enough to compel him to seek relief by taking any analgesics. The pain became less each day, and the discharge decreased in proportion, so that by November 17th, the thirteenth day, the patient was discharged, entirely free from pus and pain, and returned to work.

On December 27th the patient returned, saying he had taken

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another cold a few days previous and that his pain and discharge had returned. Examination then showed pus coming from both frontal sinuses, and the pain was distributed equally over both sides and across the bridge of the nose. He was then seen and treated three times, December 27th, 28th and 31st, and showed prompt response to treatment. The man being a railroad employe, the matter was talked over with the chief surgeon, and it was decided that perhaps a vaccine might be of benefit in raising his resistance against taking cold and future attacks. Accordingly, he was referred to the chief surgeon, who reported that he administered four doses of Schieffelin's influenza vaccine. The dose did not go above 40/100 cubic centimeter, and there was no reaction.

Although he was told to return for observation, I did not again see the patient from December 31, 1917, until January 18, 1918, when he returned saying that the previous night he had suffered intense pain, that it was well across the forehead, but more severe on the left side. On examination no pus was seen. Shrinking the middle turbinates and the nasofrontal ducts on both sides failed to reveal pus. Patient was told to return the next day, which he did, and reported the pain no better and no relief from treatment previous day. Temperature and pulse were normal, complained of light hurting his eyes, pupils were equal, and no pus could be elicited. The patient was again referred to the chief surgeon, with a request that an X-ray be taken. This could not be done that day, owing to the previous engagements of the roentgenologist; but an appointment was made for the following day. However, the boy telephoned the chief surgeon, on the following day, that he did not feel like having his plate taken that day and would like to change his appointment to the day following, and, as he lived out some distance, this was consented to by the chief surgeon. Early on the morning of January 22, 1918, the chief surgeon received a telephone call from the boy's sister, saying the boy had had a very bad night; cried out repeatedly with pain. A near by local surgeon of the railroad was sent to see him, who gave the following account of the case: Complaining of headache, but not as severe as it had been during the night; was dizzy; had vomited once; pupils were equal; no nystagmus; pulse good and strong; temperature, 101; and

tongue very foul. He gave calomel and a capsule containing aspirin, grains four, and salol, grains two, for headache. After the second capsule the patient quieted down and went to sleep; but his breathing soon became stertorous; he became unconscious; and was dead three hours after he was last seen.

Autopsy showed no general involvement of the meninges and no distention of the brain substance. The dura was found adherent to the frontal bone on the posterior surface; also adherent to brain substance over left frontal lobe. On removal of the brain from the cranial cavity yellow pus flowed freely from a perforation in the dura. Corresponding to this perforation a necrotic area was found on the frontal bone about two millimeters in diameter, which led directly into the left frontal sinus. The sinus itself measured about 1.5 c. c. anteroposteriorly, 3 c. c. transversely, and 1.5 c. c. from the top to the floor. Located in the left frontal lobe was a well defined abscess containing from one and a half to two ounces of pus, causing considerable softening and destruction of the brain substance, but not involving any vital areas. The walls of the abscess were everywhere soft and friable, and the necrosis had extended from the surface all the way through the frontal lobe and had perforated into the left lateral ventricle, which was full of pus, but did not show any lesion except the perforation. Examination of the pus showed *staphylococcus aureus*.

Remarks.—My reasons for reporting this case in detail are several. First, it is my opinion that if the patient could have been kept under close observation at the time he was taking his vaccine, and at the cessation of his discharge, and if he had had his X-ray taken when advised, operative procedure might have saved his life. I think he still had a chance of recovery up to the last morning of his life, when the brain abscess ruptured into the lateral ventricle, with resultant coma and death.

That large abscesses do occur in the silent areas of the brain without producing localizing symptoms is too well known to dwell upon.

Krause, in his *Surgery of the Brain*, reports a similar case in a woman, twenty-three years old. The sinus was

operated upon first, and later, when a fistulous tract was found leading from the sinus, an osteoplastic flap was made, and about half a wineglass full of pus evacuated. The patient did well for a time, but soon extension ensued and the patient died. No autopsy was permitted.

Skillern states, in his book, "The Accessory Sinuses of the Nose," that "Complications from the frontal sinus occur much oftener in (a) older individuals, (b) in males, (c) on the left side." He does not give data in support of this statement, however, and one suspects that they may be merely accidents of a limited body of statistics.

Krause's case was on the left side. It will be recalled that in my case when first seen the pain was more severe on the right side and remained so until the last attack. There was no extension of the left sinus over to the right side that might account for this, as the septum was directly in the median line.

Skillern also says that owing to the paucity of material and lack of sufficient American data, his section on chronic complications of the frontal sinus is based largely on Gerber's work done in Berlin in 1909. Gerber states that complications follow chronic frontal sinusitis in about five per cent of the cases, but admits that his percentage is higher than most rhinologists.

Several questions purport themselves in connection with this case:

Did the vaccine have anything to do with the cessation of the discharge?

Was the abscess forming on the left side from the beginning of the infection, or did the discharge cease when the erosion took place in the posterior bony wall of the sinus? In which event one would have to concede a cure in the right sinus.

One further consideration is: Why should this complication occur in a sinus which apparently had free drainage and which did not manifest the usual symptoms of confined pus? This would hardly be expected, even in view of the capacity of staphylococcus aureus for destruction of bone and abscess formation.

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XLIV.

BONE TRANSPLANTATION FOR CORRECTION OF NASAL DEFORMITIES.*

BY WM. F. CALLFAS, M. D.,

OMAHA.

Up to five years ago comparatively little was written on bone transplantation for the correction of nasal deformities. Since then much has been written and many methods devised. I claim nothing original except some modifications. In this paper I shall speak of three or four methods which have been very successful in correcting marked nasal deformities.

First, as to the preparation of the field of operation: Thorough cleansing of the skin or the nasal mucous membrane with soap, alcohol, iodine, or iodine and alcohol, equal parts, or silver nitrate solution, four per cent. If the intranasal method is selected, the nose is first freed of the vibrissæ, the nasal cavities thoroughly cleansed, and the posterior space packed so as to prevent contamination of the field. In selecting the extranasal route, the eyebrows are treated as the skin, and part of the eyebrows nearest to the glabella shaved. The face is cleansed with soap and water, followed by iodine, or iodine and alcohol, equal parts, or silver nitrate solution, four per cent. Cohen of Baltimore condemns tincture of iodine for cleansing purposes. He claims that in several cases in which he has used tincture of iodine he had infection following. The infection may have followed in his case had he used some other method. I think that is no argument against tincture of iodine. Other writers have used tincture of iodine with no infection. I have used tincture of iodine and alcohol, silver nitrate, solution four per cent, and have had no infection in any of my cases. After the skin preparation the face should be covered with sterile gauze, leaving only the field of operation exposed. The operator and assistant should wear rubber gloves.

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I wish to speak only of those cases in which the nasal bones are destroyed or in which the bridge lacks support, in which the deformity extends from the nasal notch to near the tip of the nose.

In selecting bone for transplantation, Back prefers the anterior margin of the tibia, and the intranasal route. The anterior margin of the tibia is easily reached, and a piece of bone the proper length, from two to two and a half inches, should be removed. This should be done by a surgeon while the operator is preparing the field for inserting the graft. The bone graft should be removed with the periosteum and placed in a warm normal salt solution. This should be trimmed by the operator to suit himself. This gives you a triangular section of bone covered on two sides by periosteum.

In the intranasal route, the nasal mucous membrane having been prepared, the incision is made through the mucous membrane along one side of the septum, at the junction of the upper and lower lateral cartilages, some distance from the tip of the nose, say three-quarters of an inch from the tip of the nose. The tissues are dissected or elevated along the dorsum of the nose and, over the nasal spine to the nasal notch under the periosteum, and down to the tip of the nose, making a pocket in the tip. After the graft is trimmed to the proper length and size, usually three-eighths of an inch thick and two inches long, it is introduced into the incision, the upper extremity pushed into contact with the nasal notch, the side of the graft which is devoid of periosteum is placed inferior, the two sides covered by periosteum being subcutaneous, the tip of the nose is pulled down and the end of the bone is slipped into the pocket at the end of the nose. No stitches are required, the mucous membrane entirely covering the graft. The nasal cavities are packed with vaseline gauze or zinc oxid gauze for twenty-four hours.

Hayden of Chicago prefers the extranasal route, and a graft taken from a rib. A thin portion of a rib should be selected, removing about two and a half inches. The edges should be trimmed to make the bone the desired width. If too thick, it can be flattened by crushing the cancellous tissue, which is easily done by tapping gently on the flat surface of the rib with a mallet. Some operators have removed the can-

cellous tissue, and used only the two compact plates, but this has proved not so successful, the graft lacking the proper nourishment, as the cancellous tissue favors the access of blood vessels which nourishes the bone. The bone graft is then taken care of as in the first method described. An incision about an inch long is made transversely over the glabella and the periosteum is elevated. I find it very much easier to elevate by this method. It is quite easy to get under the periosteum and then follow down over the nasal processes of the superior maxilla and out over the malar bones and the maxilla, gradually working your way down and in toward the nose, working from both sides to the dorsum and to the tip of the nose. The graft is then introduced, the lower end extending to the tip of the nose and the upper end resting in the nasal notch. The incision is then partly closed with stitches. There should be left sufficient space for drainage, as there is considerable bleeding, and the swelling and ecchymosis will be less if proper drainage has been provided.

William Wesley Carter of New York City prefers the intranasal route, but he selects for his graft a portion of the ninth rib with the cartilage attached. He uses two inches or a little more, two-thirds of this being rib and one-third cartilage. He removes this section with periosteum on the external surface. He splits the graft through the center, using only the external half covered by periosteum. The graft is then trimmed and inserted as in Beck's method. The cartilaginous end is manipulated into the pocket at the tip of the nose. This graft has the advantage over the other two in that there is some flexibility to the end of the nose, which should be quite an improvement. The operation is in all details the same as the one described as preferred by Beck.

These photographs were taken in the latter part of 1914, these being my first two cases of bone transplantation for the correction of nasal deformity. The deformity being very great, there was no support between the nasal spine and the tip of the nose, both of these cases being the result of an injury in early childhood. In both of these cases pieces of the nasal bones had sloughed through the skin, leaving much scar tissue. In both of these cases I selected the extranasal route, as preferred by Hayden, but used the anterior margin of the

tibia covered by periosteum, as preferred by Beck. In both of these cases, as you can see by these photographs, the deformity was extreme, and on account of the scar tissue the elevation was extremely difficult, and had to extend over both malar and maxillary bones to allow the tissues to be raised sufficiently, to introduce the bone graft. The graft was prepared, as described in Beck's method, and the field was prepared as described in Hayden's method. To facilitate the introduction of the graft, I introduced a long speculum, such as is used in submucous resections, and then separated the blades and introduced the graft between the blades. I then withdrew the speculum, leaving the graft, which was easily manipulated into the desired position. The incision was then closed with two stitches, leaving room for drainage. These photographs were taken just preceding the operation, and the second photograph two weeks later.

The objection made by some writers against the extranasal route is that it leaves a scar. In these two cases the scar was insignificant and hardly noticeable. I see no objection to the extranasal route from this point of view.

In the intranasal route, I think you are more liable to have infection, although it is claimed that the nasal secretions have a germicidal effect, but from my observations I have found that those who used the intranasal route have had more infections than those who used the extranasal route.

I also think in marked deformities it is very much easier to elevate by the extranasal route than it is by the intranasal. In the two cases I have described, the scar tissue was so strong and the deformity so great, that I am of the opinion that I could not have elevated the tissues as easily or as well had I started by the intranasal route. By using the extranasal route it was quite easy to follow down over the nasal processes of the superior maxilla, over the malar bones and the maxilla, and then work in toward the dorsum of the nose until I reached the scar tissue, which had to be cut. It was impossible to separate these, so I had to cut through this scar tissue. In both of these cases I was successful in reaching the tip of the nose without puncturing the mucous membrane or skin.

Another important point is the immobilization of the graft after it has been placed in position. Many devices have been

invented. I prefer using very thin strips of absorbent cotton, pasting these over the nose, up over the forehead and down over the cheeks, using collodion for this purpose. You can make many layers and in different directions, so that you not only make a nice shield for the nose without any pressure, but you also fasten the nose so that it immobilizes the parts very well. Along with this you can use Andrew's aluminum splint, which can be used over the collodion cast. The collodion cast in this case would serve a double purpose, as the splint will more readily adhere to the fibers of the cotton than it would to a smooth surface. The splint is made of aluminum and easily conformed to the face and nose. The surface to be molded over the nose is rough and adheres to the cotton. The splint is fastened with cotton and collodion. I also used in the two cases described, a rubber tubing in the nostrils. I used this for a double purpose. In spite of the fact that I elevated over the malar bones and maxilla, the skin was so unyielding that it pulled down on the bone graft. I introduced the rubber tubing for the purpose of helping to support the graft as well as to give the patient considerable comfort in the way of being able to breathe through his nostrils. I used no other packing in the nose.

The change in the appearance of these two men was very gratifying. One man had finished a business course and could not obtain a position on account of his deformity. Two weeks after the operation the photographer who took the first picture did not recognize him, although he was dressed in the same suit and sat in the same position as he did just two weeks previous. I have seen this man several times since and had X-ray plates made. The graft was intact.

XLV.

THE LOTHROP OPERATION FOR FRONTAL SINUITIS, WITH REPORT OF TWO CASES.*

BY JAMES J. PATTEE, M. D.,

PUEBLO.

Recent literature has contained a number of splendid articles upon both the internal and external operations for disease of the frontal sinus. Anatomic study, accurate roentgenography, genius in devising and using improved instruments, and a critical study of the comparative merits, risks and untoward results of the different operations have resulted in marvelous achievements in both extra- and intra-nasal operations.

Although each of these operations has its respective indications, surgeon differ considerably in their choice in a given case, some being quite partial to the intranasal method, while others are as inclined to the extranasal. From a general survey of published opinions, there is, in my judgment, a progressive increase in the number of internal operations with a corresponding lessening of the external. Personally, I am in accord with this order of things.

Gleason¹ thus quotes from Stucky: "Within the past three years I have been especially impressed with how little intranasal surgery is necessary to relieve the most complicated and serious conditions in which the visual apparatus presents the most alarming symptoms, and I am finding fewer cases that require the radical external operation, even for the relief of suppurative pansinitis." The same author in that article quotes Kuemmel¹ of Heidelberg as follows: "Unless there is some vital indication, too little is better than too much interference in chronic frontal or ethmoidal sinuitis." Gleason¹ then states: "There are doubtless a few cases of acute fulminating suppuration and some chronic cases where the Killian operation is justifiable or even imperative; but the fact remains that those who have done the fewest Killians or com-

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plete exenterations of the labyrinth by the nasal route have the least to regret in the number of dissatisfied patients. Except where the symptoms are most urgent, it is better to resort to less radical procedures, which in the majority of cases are adequate, and yield infinitely better results." Quoting from Watson-Williams²: "In 1911 I emphasized the complete efficacy of these intranasal methods in a considerable percentage, maintaining that they are more desirable methods of treatment than the external operation, even if not resulting in absolute cure—provided the symptoms are not such as to make more drastic operative treatment really necessary."

Although the recorded expressions upon the comparative merit of the two procedures seem to place a very high rating upon the intranasal method and cause the pendulum to swing away from the radical frontal sinus operation, it is admitted generally that a few cases at least require the external operation.

The external operation should be considered only after intranasal treatment, including the intranasal operation, has proven inefficient or in cases where, on account of anatomic obstacles or pathologic changes, nothing short of a radical operation would seem to guarantee the greatest safety and best result.

Anatomy.—Although writers have contributed much to this subject. I desire to emphasize a few points. The surgical anatomy of the floor of the frontal sinus, the anterior ethmoid cells, the cribriform plate, the middle turbinate and the lacrimal bone, all within exceedingly narrow confines, are worthy of the continued study of every rhinologist. There are, along the nasofrontal canal, severe arbitrary anatomic limitations from which the surgeon dare not vary without danger to the eye or brain. In this space, we may, indeed we must, go thus far and no farther. Removing too little is better than too much. However, unless adequate permanent drainage is established, the operation will be a failure. It is well to remember, as pointed out by Mosher,³ that the inner canthus of the eye is a valuable landmark. We have the following from Watson-Williams: "It is worthy of note that the cribriform plate does not extend forward beyond the tabula interna, and that the anterior border of the middle turbinal body is in

front of the anterior end of the cribriform. The middle turbinate forms the inner boundary of the anterior ethmoidal cells; the lacrimal bone, the outer. The width of the potential passage between the inner and outer boundaries varies with the development of the intervening cells, but in its narrowest part corresponding with the level of the inner canthus, the space measures seven to twelve millimeters in adults. Therefore, the width of an instrument intended to clear the space of obstructive cells should not exceed six millimeters, while in some patients it must be less." An injury to the lacrimal bone would be of less consequence than an injury to the cribriform plate; hence it is safer to keep laterally rather than medially if in doubt.

The adult frontal sinus, with its numerous ramifications, varies greatly in size, shape, and disposition. I shall omit a detailed description of the numerous variations, although I should like to call your attention to one feature of the Lothrop operation with relation to sinus variations, as follows: In case there is a sinus in the orbital or horizontal portion, but none in the vertical or frontal portion, this can be reached by the Lothrop operation. On the other hand, if a sinus is present in the vertical portion but absent in the orbital portion, the Lothrop operation likewise meets the requirements. In brief, a strong point in favor of the operation is its short direct entrance into the sinus at that point in its floor, where all the ramifications and subdivisions converge. Through a small opening just where the frontal, nasal and maxillary bones articulate, the different portions of the sinus are exposed. Besides the possibility of operating for a considerable distance upward and laterally into the frontal portion, one can operate posteriorly and laterally in the orbital portion. Moreover, and what is more worthy of note, the fact remains that the danger zone containing the anterior ethmoidal cells, the lacrimal bone and the anterior end of the cribriform plate can be visualized and operated from the closest and most natural approach—advantages worthy of consideration.

The presence of partitions in a sinus does not hinder the course of healing to any great extent because, as pointed out by Shambaugh,⁴ they are partial and usually extend downward from the upper margin. "These partition plates are placed

so as to interfere very little, if any, with drainage through the natural opening of the sinus, but their presence may interfere materially with the thorough exenteration of pathologic conditions within the sinus, even when performing the external operation. J. Parsons Schaeffer⁵ has observed as many even as four frontal sinuses on one side, each with an independent communication with the *cavum nasi*."

The illustrations presented are copied from the works of Lothrop and Loeb.

Pathology.—The mucous membrane in chronic frontal sinusitis is thickened with connective tissue proliferation. There is edema and pus production, with consequent polypoid formation and sometimes necrosis of bone, although, except in syphilis, this is very rare. The conservative method of treatment is efficient in the great majority of these conditions except in caries, which is extremely infrequent.

Custom differs regarding curetting of the sinuses. Some operators systematically curette every sinus as thoroughly as if necrosis or malignancy existed. I believe such procedures should be limited to hypertrophy, polypi, and exuberant granulations. In the majority of cases the mucous membrane does not reach such an advanced degree of degeneration. Moderate changes return to normal if merely drained and ventilated. On the other hand, too much curetting retards recovery and impairs results. If my opinion that the amount of curetting should be tempered by the degree of pathologic alteration is sound, then the Lothrop operation is much to be preferred to the Killian for all but the rarest of cases.

Radiography.—The skiagram is an invaluable method of obtaining knowledge along many lines. By its use we may detect variations in the size, shape and type of the sinus. By its use, too, we may determine the septal subdivisions and pathologic changes which should be regarded in choosing the method of operation. If the frontal portion of the sinus has a deep space between the outer and inner plates, a Killian operation will leave great cosmetic deformity.

Choice of Operation.—The operation of choice should be one that permits of thorough work; establishes adequate drainage through the floor of the frontal sinus; affords the best vision, the least distance and the most direct route to the site

of greatest difficulty and danger; one that permits healing in the shortest time and minimizes untoward after-effects.

The extranasal operation should not be chosen unless the surgeon is convinced it possesses advantages which guarantee better results than other methods.

The Operation.—In describing the operation, I cannot do better than quote Dr. H. A. Lothrop,⁶ the author, in his own language. "Preliminary intranasal treatment, including removal of the anterior end of the middle turbinate and breaking up some of the neighboring ethmoidal cells, is advisable because this may effect a cure. The patient should be etherized. The eyebrow should not be shaved. A single curved one-inch incision is made in the inner portion of the eyebrow, limited externally by the supraorbital notch. The bone is bared of periosteum over the area indicated in Figure 1. The sinus is entered with the chisel and enlarged by the rongeur forceps so as to make an oval opening about three-fourths of an inch long. The region is then explored with the probe, and pus, granulations and polypi are gently removed, if present, after which this curved probe is to be passed through the ostium into the nose and left in situ as a guide. Small curved curettes are then passed down from above, just in front of the probe, and the walls of the cells on the floor of the sinus are broken up. On account of the proximity of the anterior end of the cribriform plate to the ostium frontale, the posterior angle of the sinus should be constantly avoided. The operation is to be completed by means of burr drills. The rasps should be used first and may be passed from above and below through the enlarged ostium, cutting forward and laterally. The burrs and rasps are to be used alternately at the discretion of the operator, gradually reaming out all the dense bone of the floor of the sinus toward the base of the nose. This bone includes the nasal crest and spine of the frontal bone, the thick ends of the nasal bones, and the nasal process of the superior maxilla. The interfrontal septum should be perforated and then burred away so that the other sinus may be explored. Then the perpendicular plate of the ethmoid should be removed, as shown in Figures 3 and 8. Through this same opening in the anterior sinus wall and also through both sides of the nose, both of which are now accessible, the

dense bone under the opposite sinus is burred or rasped away until, finally, there remains only a thin shell of bone around the whole circumference of the floor of the sinus in front, as shown in Figures 3 and 8. In all instances, even when only one sinus is affected, experience has shown the wisdom of using the combined floor of both sides. Finally, determine that sufficient bone has been removed from the perpendicular plate and that the cells opposite the lacrimal bone, the agger nasi cells, and other neighboring ethmoidal cells have been broken up. The skin incision is closed."

Case 1.—S. F., age thirty-seven years, an Italian coal miner, consulted me November 13, 1916, having been referred by his physician, Dr. Herbert A. Black. Previous health, good. He stated that ten days previous to the consultation he was hit in the right eye with a piece of coal. No evidence of any injury could be found. On examination I found an olive-sized swelling just above the right eyeball and a little to the left of center, causing some fullness. On examining the nasal cavity, the anterior end of the middle turbinate appeared large and soft, and the mucous membrane was grayish in appearance. There was considerable grayish, rather thin discharge.

X-ray report by Dr. Crum Epler was as follows: "Right frontal sinus medium sized and diseased throughout; left seems to be normal. Right maxillary sinus is hazy and believed to be infiltrated and diseased. Ethmoidal cells diseased; the sphenoids seem to be normal."

The Lothrop operation was decided upon. Exposing the sinus, I found an unusual amount of soft, semisolid material, very vascular and appearing to pack the cavity more than polypi or pyogenic tissue usually does. A tumor was suspected, although, up to this time, I had assumed that I was dealing with an ordinary polypoid change. A free opening was made into the nose, the areas cleaned as much as possible, and some necrosed bone removed in the upper central lacrimal region. A moderate amount of similar material was removed from the maxillary sinus. The wound was closed without packing and healed by primary intention in two weeks; the external swelling disappeared.

The pathologist's report by Dr. Maynard was as follows: "Gross—Soft, irregular shaped masses; gray or grayish pink.

Microscopic—Growth shows loosely connected round cells, size varying; stroma fibrinous; very vascular with many hemorrhagic areas; many mitotic figures and occasional giant cell. Diagnosis—Sarcoma of nasal mucosa."

After about three weeks, the nose began to rapidly refill with the growth. Orbital swelling developed after five weeks. Vision, which was normal up to this time, began to diminish: diplopia due to exophthalmus appeared, and total blindness developed about six weeks after operation. The patient died February 27, 1917. See photograph, page —.

It seems to me the Lothrop operation offered, even in this case, all that operative intervention could accomplish, and that for any nonmalignant condition, at least, it permits of maximum eradication of diseased tissue with minimum surgical interference.

Case 2.—December 20, 1915, G. P., an auto mechanic, consulted me in regard to pain over the left frontal sinus. Age twenty-two years, American, married. General health, splendid. He gave a history of pain and tenderness over left eye and in left maxillary sinus on three occasions since 1907. In that year, 1907, he suffered great pain and tenderness over left eye. He was confined to bed for two weeks with fever, loss of appetite, sleep, and strength, in spite of a specialist's service. After failing to be relieved by tentative treatments he had an operation upon his nose and maxillary sinus. Following this, he received treatments including irrigations of the maxillary sinus. In 1909 he was operated upon again by another rhinologist who also opened the antrum. In 1912 the third operation was performed and seemed to be, so far as he could tell, the same identical operation as the two preceding. On December 27, 1915, he consulted me. He was again suffering intense pain over left eye; there was increased lachrimation, and considerable swelling and edema of the upper lid. Intranasal examination revealed absence of a portion of the anterior end of the middle turbinate, together with portions of the anterior ethmoid cells. There were bands of scar tissue and an occlusion of the infundibular space. Considering the cicatricial nature of the field, there was considerable redness, although adrenalin and cocain failed to shrink the parts to any extent. The pain increased, and the swelling gradually closed

the lids. After five days of fruitless intranasal treatment I advised his physician to have a Lothrop operation, inasmuch as three days previous intranasal operations had failed.

On exposing the mucous membrane of the sinus, it was found to be slightly thickened, fairly smooth and of a dull grayish red color. On opening the mucous membrane a retention abscess was found to fill the sinus. There were no polypi and no granulations. The opposite sinus was opened and found normal. A large part of the septum of the frontal was removed and the floor upon both sides was opened widely into the nose. Recovery was prompt. No disfigurement. I recently examined the patient and found no difficulty in getting into the sinus.

SUMMARY.

1. More intranasal and fewer extranasal operations are being performed.

2. The external operation should not be chosen until the internal has been found inefficient.

3. It is strange that the most essential, the most difficult and the most dangerous work is confined to the narrowest part of the nose. It is well to remember that this is on a plane with the inner canthus.

4. The Lothrop operation offers the closest and most direct exposure of this zone, hence the best visualization.

5. The amount of curetting should be tempered by the degree of pathology.

6. The operation of choice should be one that permits thorough work, guarantees drainage, permits healing in the shortest time and minimizes untoward after-effects.

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THE NOSE AND THROAT IN MEDICAL HISTORY.*

By D. A. VANDERHOOF, M. D.,

COLORADO SPRINGS.

In speaking of the nose and throat in medical history, I am going to present very little except that which can be found in a book written some time ago by Jonathan Wright, and while it is impossible to deal thoroughly with this subject in the few moments which I have, I am going to endeavor to give you some idea of our specialty in the early days of the human race.

The first reference that we have in regard to specialists is made by Herodotus. The passage reads as follows, in Rawlinson's translation: "Medicine is practiced among them (the Egyptians) on a plan of separation; each physician practices a single disease and no more; thus the country swarms with medical practitioners, some undertaking to cure diseases of the eye, others of the ears, others again of the teeth, others of the intestines, and some those which are not local."

There are a number of modern treatises upon the medical knowledge of the "Talmud." There are several references¹ to acute inflammations of the throat, which seem to refer to the existence among the Babylonian Jews of diphtheria, or of that disease described later by Aretæus as lyriac ulcer, from which "they died the most terrible death of all the nine hundred and three deaths possible."

We are still further reminded at this time of Chaldean medicine, by the incarnations spoken of as therapeutic measures, of demons as etiologic factors in fatal throat inflammations, and of the dung of a white dog mixed with myrrh as a local throat application in cases of coryza.

At times familiar surgical operations are recognized as follows: "By means of forceps between thumb and fingers, drawing the uvula forward, the physician may cut it with a

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sickle-shaped knife above the top of the tongue (uvulotomy)."

"Gilagum (quinsy), so called, may be cured by the knife. A firm, hard swelling filling the fauces, with sprouting flesh, giving rise to much pain, caused by the evil inflammation of the humors, killing almost a hundred men, is recognized as incurable; but a tumor seen in the throat about the size of the seed of the *Phyllanthus Embliva*, stationary, a little painful, made up of phlegm and blood, adherent like the fruit of the *Terminalia Alata*, this, curable by the knife, is called Gilagu."

Jonathan Wright says we are here to recognize a differentiation of malignant and benign swelling of the tonsils.

In regard to rhinoplasty: It is especially in the Hindu writings that we find complete and minute accounts of the various plastic operations about the nose. This was due, doubtless, to the practice of the wrathful Oriental potentates who amputated the nose out of revenge or in the exercise of judicial penalties.

Vaporization and fumigation through a tube were frequently employed in the diseases of the nose and throat. Stimulating and acrid vapors seem to have been recommended in what we call *ozena*.² It was also prescribed for coughs, asthma, hoarseness, mucus discharges and enlargement of the tonsils, but it was also advised in baldness and a reddish yellowness of the hair.³

Local applications of ointments were made to the nostrils and various sternutatories were used for cleansing the nasal chambers, after which, apparently in coryza, the following directions were explicit: The patient was to lie on his back, raise the tip of his nose with his index finger and allow his physician to drop in his nostrils warm oleaginous liquids. While this was being done he was not to become angry, nor speak, nor laugh, nor swallow the oil dripping from his nose, but spit it out. The use of the sternutatories, or snuffs, was also recommended for sleeplessness and clearing the head in the morning. Our douches and sprays undoubtedly correspond to the above treatment as used in the early days of the Hindus.

If a foreign body is in the throat, the extraneous matter may be discharged by thrusting down a hot iron, to dissolve or soften it, and so remove it. In such cases the hot iron is passed through a metallic tube.

The period of four or five hundred years which stretches from the supposed age of Homer to the birth of Hippocrates

(460 B. C.), is one of which we know but little in the history of medicine. There was medical knowledge in Greece before the birth of Hippocrates, but the records of it have perished and so have the works of those who followed him. He was the first to discover the probe, according to Greek legends, the first to bandage a wound, the first to teach men to draw teeth and purge the bowels.

Alcmaeon says that a moist warmth in the tongue, joined with the softness of it, gives differences of taste. Diogenes, who was born in the fifth century B. C.,⁴ says that by the softness and sponginess of the tongue, and because the veins of the body are joined in it, tastes are diffused by the tongue; for they are attracted from it to that sense and to the commanding part of the soul, as from a sponge.

Alcmaeon is said to have been the first Greek anatomist and to have dissected the eyes and ears of animals, discovering the optic nerve and the eustachian canal, thus antedating in the latter discovery Eustachius by many centuries.

When we realize that the ancients, Hippocrates, Galen, and their followers, knew nothing of the muciparous, and of course nothing of the function of these microscopic structures, it is easy to understand the absolute mental necessity for them to find some explanation if the liquid were swallowed. This lack of knowledge, as well as a mistaken anatomic observation, led them into another error which persisted still longer. The cribriform plate of the ethmoid bone at the top of the respiratory tract was usually seen only in the dried specimen by the ancients unfamiliar with dissection of the human body. The idea arose that the humors were distilled in the gland like contents of the cerebral cavities and sifted through the plate of the ethmoid to the parts below.

Herodotus says that the Libyans,⁵ when their children came to the age of four years, burned the veins at the top of their heads. Others burned the veins about the temples. This they did to prevent them from being plagued in their after lives by a flow of rheum from the head, and such they declare is the reason they are so much more healthy than other men. This burning was the sovereign Arabian cure for all diseases. During this Greek period the nature of the tonsils is also explained as round bodies placed in each side of the throat to

absorb the secretions from the head and send them back there again and to do likewise for the vapors. From acute and chronic inflammations they may become greatly swollen. For enlarged tonsils he advises evulsion with the fingers.

In regard to nasal polypi, there is nothing in the Hippocratic books so familiar to the modern rhinologist as Hippocrates' sponge method of removing nasal polypi. It consisted of tying the ends of three or four strings to a sponge cut to the proper size and shape. The other ends knotted together were fastened to the eye of a soft slender tin or leaden probe, which was pushed through the nose into the pharynx. The ends of the string thus secured were passed over the end of a forked probe held in the pharynx. By traction across this, the sponge was dragged into the pharynx, if successful bringing the polypi with it. In another method for harder growths, the principle of the snare was employed. The loop of a sinew was adjusted around the polypi, and the end having been carried to the pharynx and traction made as before, evulsion was attained. For bone-like growths he employed cauterization with a hot iron through a hollow tube used as a speculum. After all these radical operations he advised the application of copperas powder and the insertion of tents in the nostrils, smeared with oil and honey, undoubtedly to prevent synechia and stenosis.

It is about the time of Celsus and during the reign of Hadrian (117-138 A. D.) that we first read of the technic for tracheotomy. In cases of cyanosis we entirely disapprove of this operation, because the incision is wholly unavailing when all the arteries and the lungs are affected, but in inflammation about the mouth and palate and in cases of indurated tonsils, which obstruct the mouth of the windpipe, and the trachea is unaffected, it will be proper to have recourse to pharyngotomy in order to avoid the risk of suffocation. When, therefore, we engage in the operation we slit open a part of the *arteria aspera* below the top of the windpipe, about the third or fourth ring, for this is a convenient situation, as being free of flesh, and because the vessels are placed at a distance from the part which is divided. Therefore, bending the patient's head backwards, so as to bring the windpipe better into view, we are to make transverse incision between two of the rings, so that

it may not be the cartilage which is divided, and then removing the vessels aside, if they come in the way, make the incision.

Among the Greek writings of the Eastern Empire we find that Janus Damascenus recommends that in removing foreign bodies from the throat a piece of half cooked meat on a string be swallowed, then a quick traction on the string be made, which will immediately bring up the foreign body.

Tonsillectomy at this age is spoken of as follows: "When glands occur in the throat similar to the glands which occur externally, they are called the two tonsils. When thou hast treated them with those things which I have mentioned and they are not cured, look and if the tumor is hard and of a dark color, of slight sensibility, do not touch them with the knife. And if it is of a red color and the base is broad, do not touch it with a knife for fear of hemorrhage, but delay until it has ripened, for then thou canst perforate it or it will break of itself, but if it is of white color, round and has a slender base, this is the kind which is suitable and thou shouldst cut it. Thou shouldst examine before operation if the swelling has entirely disappeared, or in what manner it has diminished. Then thou seatest the patient in the clear sunlight and takest his head in thy lap and openeth his mouth and taketh the instrument in thy hands which will depress his tongue, a concave instrument, thou canst make it of silver or brass; it should be thin like a knife; with this the tongue is depressed and the swelling will then be apparent to thee, and let thy vision fall upon it. Then thou shalt take a hook and fix it in one tonsil, and with it thou shalt draw it out as far as possible; but of course thou shalt not draw out with it any of the membranes. Then thou shalt incise it with an instrument similar to a forcep, except that the ends are curved and the edge of each is opposite the other and is very sharp. It is made from Indian or fine Damascus iron. But if this instrument is not at hand thou mayst cut it with a knife sharp on one side; less so on the other."

Berenger, who taught surgery at Bolonga from 1502 to 1527, was the first to describe the sphenoid sinus, which he considered the source of catarrh; and it was also he who is credited with being the first to definitely indicate the accessory

nasal sinuses, although Galen refers in several places to the porosity of the bones of the head, making them of little weight, but there is no direct reference to the sinuses. It was Ingrassias in Sicily, in 1563, who was the first to describe the anterior ethmoid cells and likened the structure of the bone to pumice stone. Colombo and Ingrassias both described the inferior turbinated bones, but Casserius in 1610 described them all and gave them their present name.

One can easily recognize the similarity of the operations performed in the early days with those of today, and if we had time we could follow their improvements step by step. Instruments have been improved upon, technic has been simplified, but nevertheless the similarity is there.

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XLVII.

RELATION OF BLOOD PRESSURE TO PATHOLOGIC CONDITIONS OF HEAD AND NECK.*

By T. E. CARMODY, M. D., D. D. S.,

DENVER.

While the study of blood pressure variations in pathologic conditions of the heart and circulatory system has been used by the internist routinely for some years, it is only recently that those doing special lines of medical practice have resorted to its use as an aid in their work.

Our attention was called to its value in the first place in connection with vesicular lesions, and further use has convinced us that it should be used as a routine measure in every case. The reasons for this would seem at first to be few, and it would be found less frequently necessary in well regulated hospitals where our patients had been subjected to thorough examinations before coming to our hands. This, however, unfortunately, cannot be, or is not the case with more than a small percentage of our cases, and it behooves us to protect ourselves by making such tests as may also protect our patients.

I have found very little in the literature devoted to blood pressure which even mentions diseases of the nose, throat or ears, except in a general way.

It may not be out of place to give concisely the method usually employed in taking the blood pressure, although we have for the last three years employed the coagulation test, and taken the blood pressure in surgical cases before operation, we have developed nothing particularly new in the technic. The following is the method usually employed and the precautions to be observed, according to Faught:

Suggestions to Be Followed and Precautions to Be Observed While Using the Sphygmomanometer.—Position of the pa-

*Read before the Mid-Western Section of the American Laryngological, Rhinological and Otological Society, Boulder, Colo., Feb. 23, 1918.

tient: Whether the observation is made in the reclining or sitting posture will be determined by the nature of the case and by exigencies of practice. In the critically ill, the horizontal posture is preferable, although it will not always be found convenient or possible in the presence of orthopnea, while in ambulatory cases it will not always be found convenient to employ the horizontal. One point to be borne in mind is that for purposes of comparison it is essential, whenever possible, to make all subsequent observations in a case in the same posture as was at first. At all events, the location of the arm band, irrespective of the patient's posture, should be at the heart level, thus eliminating the error due to gravity. Under all circumstances the patient should be in a comfortable position and one favoring muscular relaxation.

Application of Cuff.—The cuff is usually applied to the arm above the elbow and should be maintained at the heart level. It should be applied directly to the bare arm or over very thin coverings, and wrapped firmly. This will avoid the unnecessary delay required to fully inflate a loosely applied arm band. The arm band should not exert pressure. This point is also of importance in using any method other than the auscultatory, since the grade of the volume of confined air, the less marked will be the rhythmic impulse transmitted to the manometer.

Time of Observation.—Whenever possible, observation should be made at about the same time of day and in the same relation to the taking of food. Observations should not be made during periods of excitement or after exercise or in periods of profound fatigue, neither after the injection of large amounts of fluid or of stimulants, as tea, coffee or alcohol. An overheated or unduly chilled extremity will affect the arterial pressure in the part. Observations made under pathologic conditions such as edema or spasms are absolutely unreliable.

Fear and psychic disturbances markedly influence the readings; for this reason, in the nervous and excitable, the initial reading is often higher than those made subsequently.

Condition of Indicator and Cuff.—A leaky apparatus will give unreliable readings; old rubber parts are often responsible for this. When properly connected the apparatus should

be able to sustain the mercury column without receding. A rapid fall indicates a leak somewhere in the air system and should be corrected. At the beginning of each test the indicator, irrespective of type, should register zero, and in the mercury instruments the mercury column should not be broken. This latter condition may be overcome by abruptly jarring the apparatus until the mercury unites.

The Performance of the Test.—The greatest rapidity compatible with accuracy is essential, since undue delay while the arm is under compression will, through vasomotor influences, give a disagreeable sensation and may also affect the systolic pressure. Two or more readings should be made, whenever possible, for purposes of verification, to eliminate psychic and other transitory sources of variation, and no single observation should be accepted when it is possible to make additional ones.

The Keeping of Records.—Whenever possible blood pressure records should be preserved. This not only makes for accuracy in individual readings, but also furnishes valuable data for comparison, not only in the same case, but also in statistical studies. For this purpose a card is employed upon which individual daily records are made and filed, and from which, when desired, graphic charts are easily compiled.

The Scope of the Test.—The clinical determination of blood pressure involves an estimation of the systolic and diastolic pressures, from which may be determined the pulse pressure and the mean pressure. The value of the observation is enhanced if the pulse rate is recorded as a part of this examination.

Any peculiarities noted either while palpating the pulse or in variations from normal in the series of sounds heard during auscultation of the vessels should be recorded. Valuable supplementary information may be developed through a careful consideration of these factors.

While the palpatory method has been used in most of the cases reported by us, we use the auscultatory in many, and while the latter is acknowledged to be the most accurate, we feel that the former has given us much valuable information

in many cases. The other methods not being used frequently, except the graphic, which is essentially a laboratory aid and method for experimental cases and requiring much apparatus, and will only be mentioned.

The Visual and Oscillatory.—Mention has been made by a number of authors in using the auscultatory method of the use of a small bell to the stethoscope. This was found to be especially necessary in a number of very small children examined for me by Dr. Fleming in the Children's Hospital. (Instruments used were Faught and Tycos.)

The reason we do not have more accidents due to high pressure in our operative cases is probably because of the fact that before all operations the patient is purged, and according to the observations of Neilson and Hyland, especially in the study of the effect of magnesium and sodium sulphate, sodium tartrate, and compound jalap powder in the usual therapeutic doses.

The systolic pressure was tested in one hundred and twenty-six patients, of whom one hundred and nine showed a lowering of the systolic pressure varying from five to thirty-five per cent. Twelve showed practically the same blood pressure throughout the experiment. Five showed an increase during the experiment. Twenty-four hours after the cathartic was given, forty-eight had a systolic from five to eighteen per cent lower than before the cathartic was given. Twenty-six had practically the same as at the beginning. Only those who remained in bed were tested twenty-four hours afterward. The action of the different cathartics was practically the same, except that the compound jalap produced a more constant and greater lowering than the others. They also showed in most instances quite a decided lowering at the end of twenty-four hours. It was found in this set of experiments that those individuals with a systolic pressure of 140 and above, the highest test being 190, gave an average lowering of 23 millimeters Hg. Fifty-seven individuals, with a pressure from 110 to 140, gave an average lowering of 13 millimeters Hg., while thirty-four individuals, with pressure of 110 or lower, gave an average lowering of 7 millimeters Hg.

A study of systolic, diastolic and pulse pressures and the rate of heart beat was made on sixty-eight individuals.

Percentage lowering of the systolic pressure in this number, taken as a whole, was seventeen per cent.

The diastolic pressure was lowered eight per cent. The pulse pressure was decreased twenty-four per cent.

The number of heart beats as a whole were decreased fourteen per cent. Fifty-six patients showed a decrease, nine showed an increase, and five showed no change.

If we examine these results, we find that an average lowering for all cases is 18 millimeters Hg. The average lowering for those who had initial pressures ranging from 140 to 190 was 23 millimeters Hg.

Those individuals who had a low initial pressure lowered only 7 millimeters Hg.

For instance, one fell from 180 to 100; another from 170 to 120; another from 190 to 115; another from 120 to 80; another from 108 to 78, etc. It is in these extreme results that we most frequently find the developments of an arrhythmia or the increase of an arrhythmia already present.

The result of this set of experiments, supported by the clinical facts that patients with diseased hearts may become worse on brisk catharsis, warrants the assumption that all cases, in which severe purging is used for depletion of the blood, ought to be controlled by watching carefully the blood pressure, heart beats, and regularity, and the general condition of the patient.

The control of bleeding as well as the lack of pathologic heart symptoms due to high pressure, may in many cases be due to withholding water before operation and the subsequent laxity of blood vessels on account of lessened fluid.

Hemorrhages from the nose and throat should not be a cause of alarm unless the pressure drops suddenly, and in many cases should be cause for rejoicing.

Briggs reports a case of intracranial hemorrhage, with a blood pressure of 400 millimeters Hg. While we cannot report a case with this pressure, one of the first cases to impress the value of the estimation of blood pressure, in our work, was a nasal hemorrhage.

Patient, woman, sixty-five years old, had been suffering from nasal hemorrhage for about an hour and fifteen to thirty minutes, when the author arrived. As pulse seemed full,

pressure was taken and found to be 296 millimeters Hg. systolic. Judging from this that she had simply, by good fortune, escaped intracranial hemorrhage, she was allowed to bleed, the pressure being taken frequently for about one and one-half hours, when hemorrhage ceased, with blood pressure at 190 millimeters Hg. There has not been a recurrence, and patient is in apparent good health. Three and one-half years have elapsed since this experience, and it has been our practice since to take the blood pressure in every case of nasal hemorrhage before attempting any method of control by local means.

A case seen recently with a history of considerable bleeding for three days (a young man of twenty-two years), and on examination bleeding had ceased, although a large clot was removed from the left nostril. Blood pressure was 128 millimeters Hg. systolic. Thirty-six hours later the pressure was 155 millimeters Hg. Twenty-four hours later, 138 millimeters Hg.

Our ear examinations are not complete today without recording the blood pressure, as we may find in otitis media chronica cases, especially those with tinnitus, a lower blood pressure with less frequently a high, and in a very small percentage, normal.

Our observations in children have been very interesting, and in many cases, especially those referred for tonsillectomy, we have been able to suggest a possibility of pathology in remote organs to the internist. The tables may be of interest:

Age	Coagulation	Hemoglobin	B. Pres.
5 yrs.	2m.	90%	76
11	1m. 40s.	75%	88
20	2m. 10s.	75%	118
23	1m. 15s.	80%	112
10	1m. 10s.	75%	96
8	2m.	75%	80
24	55s.	75%	108
32	1m. 5s.	75%	118
19	1m. 50s.	75%	120
23	45s.	85%	118
45	1m. 35s.	85%	113
3	2m. 15s.	75%	52

Age	Coagulation	Hemoglobin	B. Pres.
2	1m. 30s.	75%	.....
23	1m. 5s.	85%	116
13	1m. 25s.	85%	102
23	1m. 10s.	85%	115
5	1m. 55s.	65%	59
8	2m. 15s.	75%	79
23	1m. 20s.	75%	104
15	1m. 35s.	85%	108
35	1m. 10s.	75%	120
7	1m. 45s.	65%	82
3	2m. 5s.	80%	54
12	2m. 45s.	85%	74
6	1m. 45s.	65%	64
36	1m. 38s.	75%	117
24	1m. 45s.	75%	110
12	2m. 5s.	65%	96
10	1m. 10s.	80%	78
17	35s.	80%	110
10	2m. 15s.	80%	92
40	1m. 30s.	80%	115
26	2m.	80%	110
7	1m. 40s.	80%	82
31	1m. 28s.	75%	90
14	1m.	70%	92
10	1m. 50s.	60%	92
12	1m. 15s.	65%	90
4	2m.	70%	60
11	2m. 30s.	65%	80
26	1m. 20s.	75%	118
33	1m. 30s.	75%	106
20	1m. 15s.	75%	116
20	1m. 58s.	75%	115
32	30s.	75%	120
24	1m. 20s.	80%	110
21	50s.	75%	104
12	2m. 10s.	80%	92
25	1m. 45s.	65%	102
13	1m. 37s.	80%	112
29	1m. 15s.	65%	103

Age	Coagulation	Hemoglobin	B. Pres.
28	45s.	80%	125
6	2m. 5s.	80%	91
28	2m. 40s.	80%	110
17	1m. 30s.	85%	108
3	2m. 10s.	65%	64
44	30s.	85%	130
33	1m. 20s.	75%	108
8	1m. 30s.	85%	85
13	1m. 35s.	70%	100
20	1m. 15s.	85%	112
21	1m. 5s.	85%	105
22	2m. 25s.	90%	120
9	1m. 5s.	60%	78
45	1m. 5s.	75%	134
13	1m. 15s.	65%	90
35	50s.	85%	120
4	1m. 35s.	75%	84
15	25s.	80%	102
6	55s.	85%	98
31	55s.	85%	122
22	1m. 5s.	85%	110
19	1m. 50s.	85%	116
50	50s.	75%	118
7	2m. 45s.	75%	106
6	1m.	80%	98
8	1m. 30s.	80%	65
7	55s.	90%	70
5	1m. 10s.	80%	65
26	2m. 15s.	75%	120
18	2m.	75%	118
16	30s.	85%	118
20	25s.	85%	98
26	40s.	75%	110
16	3m.	75%	84
12	1m. 40s.	85%	94
33	1m. 40s.	85%	114
22	1m. 40s.	75%	112
4	1m. 45s.	70%	64
5	1m. 40s.	75%	60

Age	Coagulation	Hemoglobin	B. Pres.
7	3m. 10s.	70%	70
2	2m. 45s.	70%	.....
7	1m. 20s.	55%	70
7	2m. 20s.	85%	72
		Sys.	Dias.
7 yrs.		90	40
12		120	75
18		130	60
8		105	85
8		110	60
13		130	50
11		105	60
10		130	70
5		80	50

Average age, $17\frac{1}{2}$ years. Average coag., 2m. 1s. Average
H. G., $76\frac{3}{4}\%$. Average B. P., 95.

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

The Morbid Anatomy of War Injuries of the Ear.

FRASER, I. S., AND FRASER, JOHN.

Pro. Roy. Soc. Med., Lond., 1917—Sec. Otol., X—56.

The writers classify injuries of the ear according to morbid anatomy as follows:

(1) Direct injuries due to bullets or piece of shrapnel of high explosive shell. (2) Indirect injury due to blows or falls on the head. These injuries may be subdivided into (a) those without fracture of the labyrinth capsule, and (b) those with fracture of the labyrinth capsule. (3) Noise deafness due to prolonged or intense gun fire, and (4) "shell" or "explosion" deafness (labyrinth concussion).

(1) Direct Injuries.—Fracture of the mastoid process or of the external meatus may occur with or without splintering of the bone. The tympanum and labyrinth may also be involved in these cases. Further, the middle and inner ear may be injured by bullets entering through the facial bones and emerging through the mastoid or remaining embedded in the temporal bone. If the patient lives, the nature of the injury can best be ascertained by means of good radiograms—both lateral and anteroposterior. In severe and fatal cases of comminuted fracture of the petrous bone microscopic examination of the ear would be a matter of extreme difficulty, but where the injury is less severe this method may be of use. In many of these cases of direct injury suppurative otitis media occurs as a result of infection, either carried in by the foreign body at the time of the injury or due to secondary infection through the eustachian tube or external meatus.

(2) Indirect injuries of the ear due to fractures at the base of the skull in civil life has already been presented by J. S. Fraser.

(3) Noise deafness is due to physiologic overstimulation of the auditory apparatus. Recent researches have shown that

(a) air conduction of sound is of paramount importance in the production of noise deafness. Conduction through the tissues of the body, including the cranial bones, is of little account. (b) The neuroepithelium (hair cells) of Corti's organ are first affected, later the supporting cells are involved. The ganglion cells and nerve fibers are secondarily affected. The condition is one of so-called "degenerative neuritis." (b) The part of Corti's organ affected depends on the pitch of the sound. If the noise be of high pitch the neuroepithelium at the base of the cochlea is involved. If the noise be of medium pitch, Corti's organ in the middle of the coil is affected; while if the noise be of low pitch, degeneration is found in a portion of Corti's organ nearer the apex of the cochlea. These experiments confirm Helmholtz's theory of the peripheral analysis of sound.

It is very difficult or impossible to draw a line between cases of "noise" deafness and those of "shell" or "explosion" deafness, as both conditions are probably due to excessive movements of the atmosphere conveyed to the labyrinth. The explosion of a shell not only causes a great mass movement of air but produces a loud noise. It is stated, however, that the "blow" produced by the condensation of air following the explosion, reaches the ear before the noise vibration, and that it may drive the stapes inward and fix it in the oval window so as to lessen the bad effect of the loud noise which follows.

In somewhat the same way the stapes is fixed in Gellé's experiment.

(4) "Shell" or "Explosion" Deafness (Labyrinth Concussion).—According to Lermoyez, "shell" deafness is the true war deafness. Various theories have been put forward as to the pathology of this condition. (a) In many cases we are actually able to observe a rupture of the tympanic membrane, accompanied by a certain amount of hemorrhage. It has been stated that in cases of shell explosion in which the drumhead ruptures, there is less likelihood of damage to the delicate structures of the membranous labyrinth than in cases in which the tympanic membrane does not give way. In the same way the internal mechanism of a watch, which has been dropped on the ground, is more likely to escape injury if the

fall results in the fracture of the watch glass. Mere rupture of the drumhead, however, unless accompanied by some lesion in the labyrinth, auditory nerve or brain, would produce only a slight diminution of hearing. We know, however, that patients suffering from severe shell deafness exhibit marked or total loss of hearing. Some further lesion in the auditory apparatus must therefore be sought for.

(b) It has been stated that hemorrhages occur in the perior endolymph spaces of the inner ear and that the delicate neuroepithelial sacs and tubes of the membranous labyrinth are ruptured by the violent concussion caused by the explosion. It is supposed that in this way a gross mechanical effect is produced in the inner ear. It would appear, however, that the structures of the membranous labyrinth are well protected from concussion because they are suspended in a lymph bath inside the hollow spaces of the bony labyrinth.

(c) It has been suggested that apart from these gross mechanical changes (a) and (b), the explosion and the loud noise may destroy the delicate nerve endings in the cochlea and so result in paralysis. The loud sound due to the explosion may paralyze the hair cells of Corti's organ, somewhat in the same way as the nerve structures of the macula in the retina are paralyzed by the rays of the sun in "eclipse" blindness. According to this theory, "shell" deafness, like "noise" deafness, is due to paresis or paralysis following overstimulation. Some observers hold that the change is a biochemical one, while others believe that it is of a molecular nature. Theodore has microscopically examined one case of labyrinth concussion followed by total deafness, and found a condition of degenerative neuritis similar to that described by Manasse and Wittmaack in old people.

(d) It has been stated that in cases of "shell" deafness the lesions are probably to be found in the brain—e. g., hemorrhages in the pons, medulla, and cerebellum, involving the central connections of the auditory and vestibular nerves. Milligan and Westmacott have suggested that shell deafness is due to a temporary interference with the neuron connections in the higher brain centers. They believe that the abrogation of function is not due to an organic lesion.

Severe Complications of Suppurative Otitis.

BRINDEL.

Rev. de laryngol., Paris, 1917—XXXVIII—1.

In one year there were 3,110 patients admitted to his service, of which 1,550 were hospital cases. Six died from auricular complications and four others, though seriously ill, were saved.

Of the 3,100 cases, 800 were affected with ear discharge (350 acute and 450 in which the discharge had lasted for some time). Mastoid complications occurred 108 times, 78 due to recent suppuration and 30 to exacerbation of an old otorrhea. Of the ten severe cases already mentioned, five were acute and five were due to an acute recurrence. The following were found in the ten cases: Meningitis, five times, with four deaths; brain abscess, one death; pyemia, once, death; labyrinthitis, recovery; extradural abscess, one, recovery; extradural abscess, one, recovery; sinus thrombosis, one, recovery.

Conclusions:

1. That intracranial complications of otitic suppurations are very dangerous, and surgical treatment is more efficacious from a preventive than curative standpoint.

2. Half of the complications may be avoided if attention is paid to the cure of chronic suppurations. A good portion of the other half will be prevented if early and radical intervention is undertaken as soon as there is any danger of mastoiditis.

3. Erysipelas, in the course of an acute suppuration, increases the virulence of the pathogenic germs and favors meningitis.

4. A discharge of the ear may be the cause of cerebrospinal meningitis.

A Contribution to the Etiology of Shell Shock.

WILTSHIRE, H.

Lancet, Lond., 1916—I—1207.

Wiltshire offers the following conclusions as to the etiology of these conditions:

1. The wounded are practically immune from shell shock,

presumably because a wound neutralizes the action of the psychic causes of shell shock.

2. Exposure and hardship do not predispose to shell shock in troops who are well fed.

3. While it is theoretically possible that physical concussion resulting from a shell explosion might cause shell shock, it is certain that this must be regarded as an extremely rare and unusual case.

4. Chemical intoxication by gases generated in shell explosions cannot be more than a very exceptional cause of shell shock.

5. Gradual psychic exhaustion from continued fear is an important disposing cause of shell shock, particularly in men of neuropathic predisposition. In such subjects it may suffice to cause shell shock *per se*.

6. In the vast majority of cases of shell shock the exciting cause is some special psychic shock. Horrible sights are the most frequent and potent factor in the production of this shock. Losses and the fright of being buried are also important in this respect. Sounds are comparatively unimportant.

7. A consideration of the causes and frequency of relapses favors an original cause of psychic nature.

8. Any psychic shock or strain may cause a functional neurosis, provided it be of sufficient intensity relative to the nerve resistance of the individual. Such shock or strain need not have any connection with "sex complexes."

Injury of the Auditory Organ by Detonations; How Can They be Cured?

WICART.

Bull. Acad. de méd., Paris, 1917—3, s.—LXXVII—51.

Injury to the ear is exceedingly common by reason of the extreme bombardment and violent attacks which the present war has brought about. The detonations attack the auditory organ either by way of the labyrinth or the middle ear, or both. The external ear comes into play only insofar as it contributes to the results, when there is a mass of cerumen in the external auditory canal; especially if it is hard, it may be

forced through the tympanic membrane. The labyrinth is most affected of all the elements of hearing. Vertigo, tinnitus, stupor may persist for a long time; long bombardment, with explosion of shells, furnishes easy proof of this. In this connection, minute analysis of the organs and of the therapy demonstrates that isolated attacks of the labyrinth produce only passing disease, easily curable and without any real destruction; without lesion of the middle ear, and without persistent compression through the organs of transmission, the labyrinthine concussion disappears quickly with the rest. It must be the explosion of shells which produces the great majority of cases of loss of hearing.

By the repetition and violence of these air shocks, the middle ear becomes congested, even up to hemorrhage, or there may be small intratympanic hematmata, resulting later in large perforations.

All these traumatisms are only the very reduced consequences, without complications, which depend on the previous state of the subject, and which are the true causes of the great majority of destructions of the auditory organ. These observations, based on numerous patients seen in consultation, justify the following conclusions:

1. Ears that have been previously attacked with suppuration, with actual cicatrization of the tympanic membrane, are the most susceptible to detonations.

2. Traumatized ears which suppurate at the same time may owe this suppuration and all these complications which result to the mucopurulent nasopharyngeal catarrh; the otitis which disturbs, little by little, the function of the labyrinth, and the largest incurable perforations of the tympanic membrane, are the consequence.

3. When one ear is attacked, or when one ear remains affected while the other is cured, there is nasal and tubular obstruction on the diseased side from catarrh, turbinate hypertrophy, deviation of the septum, etc.

4. Cephalic congestion, toxic hypertension, syphilitic, sclerotic, malarial, arthritic, etc., present often after the traumatism labyrinthine phenomena, are apparently connected with the internal ear and are due in reality to disorders of the middle ear. In these cases general treatment should be given in

connection with local treatment, the last being addressed to the nasopharyngotubular conditions.

5. Suppuration of the middle ear rarely remains longer than five to ten days after traumatism.

Prophylactic Measures.—The ordinary precautions against detonations consist in placing cotton in the canal and opening the mouth at the time of firing. For these it is well to substitute the following: To open the mouth by yawning, or better, to swallow strongly several times while the nose is compressed between the two fingers in order to open the tubes at the moment of detonation; to cover the auricular canal and the mastoid with a pad of cotton, after having previously filled the canal with a mesh of absorbent cotton saturated with glycerine.

Primary Treatment of Gunshot Wounds of the Ear.

KLESTADT, W.

München. m. Wchnschr., 1916—LXIII—1499.

In the absence of visible associated injury of the bony framework of the head and the soft parts at or near the ear, active measures and otologic consultations are not usually called for. On the other hand, treatment by a specialist is urgently required in the presence of labyrinthine symptoms, or when the gunshot wound has been added to a long standing unhealed ear suppuration. In a general way, gunshot wounds of the ear are treated in accordance with the principles governing the surgical treatment of gunshot wounds of the skull. Middle ear wounds are left alone, unless they give evidence of infection and endanger life. On the first signs of middle ear infection, active treatment must be instituted. All other ear injuries which are known to take an unfavorable course without operation and which are apt to induce remote sequelæ call for surgical interference. Foreign bodies should be removed as soon as possible, with the assistance of radiography. Small wounds on the surface of the petrous region should be carefully examined, because of the possibility of serious hidden lesions. After operations on the petrous pyramid, the pa-

tient should be kept at rest a suitable time before transportation to another hospital.

Summarizing, the primary attitude toward indirect ear injuries is passive, while towards gunshot wounds of the ear itself is active.

Aural Prosthesis.

PONT, A.

Brit. Dent. J., Lond., 1916—XXXVII (War Suppl.)—382.

Up to the present time recourse has been had to appliances in vulcanite, metal, and porcelain, concerning which there is nothing in particular to mention except as regards the means of retention, and from this point of view one must consider three things:

1. Total absence of the pinna.
2. Presence of a larger or smaller stump more or less deformed.
3. Absence of a portion of the pinna, the portion remaining having a normal form.

(1) The total loss of the pinna. The apparatus is retained by two means which are complementary to each other. In the first place, by means of gold wires enclosed in soft rubber and making springs. Two or three of these springs go away from the apparatus to which they are fixed, diverging one from the other. When fixing the apparatus one draws them together and introduces them into the external auditory meatus. Once in place they firmly hold the apparatus by the pressure they exercise against the walls of the passage. The second means of retention consists in a shaft of steel, similar to the sidepiece of spectacles, which goes away from the posterior side of the artificial ear, concealing itself in the hair and making a point of contact by bending over the top of the skull.

(2) Where only a more or less deformed stump of the ear remains to be replaced, one can make use of a first means of retention in the external auditory meatus, as in the preceding case, and by a second retention appliance made by a screw or hook passing across a perforation which has been made arti-

ficially in the stump. If the stump is flattened and offers enough resistance one can, as Martin did, make an artificial ear in two parts, one fitted into the other, like a box and its lid, encircling the stump, which in its turn, holds up the apparatus.

(3) Where the pinna is defective in part, the missing part of the ear may be made, and this artificial portion is retained, either with some hooks passing into one or two perforations of the ear, in case of need securing the stability and the immovability of this apparatus, whether with a spring into the external auditory passage, or with a little shaft of steel passing behind the pinna of the ear and bending slightly in front.

This type of prosthesis is inconvenient on account of the weight and fragility of the apparatus, and, above all, the necessity of combining the means of retention, which are complicated and sometimes hardly trustworthy. For this reason Pont decided to use the plastic paste in case of a partial or total loss of the pinna of the ear. A model of the region of the ear was taken, and from this model a wax ear was made. Into this model, which is made into two parts, the plastic paste, which had been previously melted in a water bath, is poured. After half an hour the ear is taken from the mould, the surplus of paste was cut away and the ear was put into place and fixed with paste.

Double Facial Paralysis of Traumatic Origin.

HALLEZ, G. L.

Rev. d. laryngol., etc., Paris, 1918—XXXIX—25.

Facial diplegia from nonsurgical causes is seldom met with in the isolated state. Sainton in 1901 devoted a comprehensive work to this subject, but we have never encountered a case.

Traumatic facial diplegia seems to be of still rarer occurrence, and Sainton in his work cites only the three cases of Gama, Romberg and Calowski. To these are to be added that of Bayer of Brussels and two observations published since the war, the one by Chatelin and Patrikios, the other one by the writer and R. Oppenheim.

On account of the rarity of these cases, of the absence of autopsy or of surgical intervention, the probable nature and seat of the symmetrical lesions of the seventh pair have not been precise. Nevertheless, the facial diplegias observed following injuries have all presented, up to the present, the characteristics of peripheral paralysis.

Mention must be made of obstetric diplegia due to the compression of the facial nerve by the two spoons of the forceps, the published cases of which are extremely rare.

The surgical cases are almost always due to a fracture of the two petrous bones: immediate traumatism (sharp compression between two resisting bodies) or mediate traumatism (transverse fracture of the two bones consecutively, from a fall backwards, on the occipital region—see observation II) or to a violent shock on this point, by a weapon or projectile.

As simple paralysis of the same origin, facial traumatic diplegia can be produced immediately by a serious and immediate injury of the nerves (section of the nerve trunk, hemorrhages of the fallopian canal or of the internal auditory meatus) or, on the contrary, successively, slowly, at the end of several days; it is then generally progressive, more benign; it is the compression which interferes especially. It may result from a slight fallopian hematoma, a reparative or neighboring periostitis (bilaterally suppurative otitis following a rupture of the tympanic membranes). Finally a simple neuritis can exist with congestion of the nerves which are found henceforth confined in their bony inextensible canal.

As for the wounds of the cheeks or of the temporal parotid region by a war projectile, not considering the serious mutilations of the face, they involve very frequently all or part of the facial nerve, but we may search in vain through the most interesting observations of Mouré, Lermoyez and Morestin for the description of wounds symmetrical enough to realize the facial diplegia type. Independently of these diverse courses, and of the meningeal hemorrhages capable of injuring the nerve trunks in their intercranial passage, between their origin and the internal auditory meatus, we may ask, in the light of the pathology of war, if the deflagration of the explosives may not be responsible for this syndrome. Perhaps the rapid force of the explosive shock transmitted "thirty fold" to

the labyrinth by the tympanic membrane and the ossicles (Lermoyez) can produce hemorrhages in the fallopian canal severe enough to cause its inhibition. We know now enough cases of hemorrhages distant from the nerve axis to admit, at least in theory, the possibility of such a mechanism.

Whatever it may be, a facial traumatic diplegia is concerned in reality only with the juxtaposition of two simple facial paralysees, and we are concerned only with the particularities which depend on the association of these two monoplegias. Contrary to that which is observed in clinical medicine, the bilateral paralysis is generally simultaneous unless the injuries of the two petrous bones are of very different character.

In fact, the two halves of the face are not affected in an absolutely symmetrical way, and almost always the paralysis predominates on one side or the other. The difference of aspect is due either to the dissymmetry of the initial injuries or to the unequal rapidity of their restoration. The aspect of the wounded is characteristic; he presents the physiognomy of a statue; the face is like an expressionless mask, says Sain-ton. No movement of the mind and of the heart is expressed by the features, which are fixed.

The skin of the forehead is entirely smooth, the wrinkles of the face have completely disappeared, and the subject seems rejuvenated. The eyebrows are less arched, the lids, constantly half opened, let the tears fall, the nasolabial grooves no longer exist, and the opened lips sometimes let the saliva escape, and the wounded man must staunch it almost continually with his handkerchief.

The eyes preserve a strange fixity because the lids do not touch. In observing the sign of Charles Bell (superior external rotation of the ocular ball in the efforts of voluntary closing) which exists to right and to left, he happened to find the sign of N  gro which distinguishes which is the side most involved: in looking up as far as possible, an asymmetry in the position of the eye may be noted; that of the more paralyzed side describes a greater rotation in height and comes to a higher level than the other, showing that the phenomenon of the substitution reflex of MacCarty (fibrillary contractions of the orbicularis by percussion of intraorbital nerve) was lost on the right and left side.

There is a singular contrast between the precision of the answers to questions asked and the stupefied aspect of the inert face. The nostrils are immovable, laughing and crying are manifested only by a different expression of the glance and by the coloring of the face. "It is a peculiar thing to hear a laugh from a face that expresses nothing" (Hallion).

Lateral movements of the tongue are possible, but it can neither be extended outward nor curved upward. Mastication is very painful because of the paralysis of the cheeks; food gets in between their flaccid walls and the dental arch. Pronunciation of certain letters as, for instance, the labials, is quite difficult, and speech becomes often incomprehensible. They can neither whistle nor whisper.

The palate is generally intact, because its muscles are enervated by the vagospinal and the trifacial (Lermoyez). Disturbance in taste is common and is localized in the two anterior thirds of the tongue. An edema of the two cheeks is constantly marked, accompanied by disturbance of the perspiratory reaction of the face.

The reaction of degeneration is almost always present. Although the injuries are usually peripheral, a predominance of diplegia in the region of the inferior facial may be observed either from the beginning or after a certain time. This particularity is not surprising. Moure has shown us, apropos of the facial paralysis of war, that an injury, especially over the trunk of the nerve itself, may cause a dissociated paralysis, localizing itself preferably on the fibers of the inferior facial. Moure proposes the following explanation: the funicular portion are composed of peripheral fibers related to the muscles of the lower part of the face, and the central fibers are attached to the upper muscular group. The peripheral fibers would then be more sensitive and more exposed to irritation of external origin. One can thus conceive that the less serious alteration of the central fibers or their more early restoration cause a simple paresis of the forehead and of the orbicularis palpebrarum contrasting with a real paralysis in the region of the inferior facial.

The observations which follow present in totality the symptoms which have just been described:

Case 1.—Wounded man had a double facial paralysis of the peripheral type of about six weeks' duration. The paralysis was absolute on the left side; on the right side the very slight movement of the eyelid was possible.

The aspect of the face is characteristic—forehead smooth, cheeks pendant, half opened eyes, etc. Speech was almost incomprehensible; mastication and especially swallowing of liquids very difficult. Electrical examination showed an actual reaction of complete degeneration for the facial nerve of both sides.

The interest of this observation rests in the cause of the diplegia. The wounded man was in the act of discharging a dung cart which suddenly recoiled; his head was pressed transversely between a wall and the back of the heavily loaded cart. As soon as he was freed his left ear bled, and diplegia, it seemed to him, was manifested immediately (this point is difficult to determine). His face was swollen for several days; he had numerous ecchymoses in the temporomalar region, and swallowing was very painful on account of the trismus which disappeared in several days.

Apparently the nerve was injured on each side in the petrous bone by a transverse fracture of the base of the skull, although there was no symptom in relation to an important injury of the auditory apparatus.

Case 2.—Soldier, twenty-eight years old, wounded at Douaumont on the 27th of October, 1917, by the bursting of a large shell near by. He suffered immediate loss of consciousness, followed by prolonged amnesia. He had no external injuries, but suffered facial diplegia, bilateral otorrhea, abundant epistaxis and slight left mydriasis. During the first few days he fell into a semicoma; then when he recovered he complained of intense vertigo with nausea. He could hear with difficulty on the right side, but not at all on the left. The epistaxis and the hemorrhages of the auditory canals were renewed with a certain frequency. He had the typical aspect described before: the corneal reflex and the reflex of MacCarty were abolished on both sides; the cornea was sensitive; the pupil was on a higher level on the side where the facial paralysis was especially marked (signs of Charles Bell and Négro associated). There was no trace of ocular paralysis; diplopia sought for

with care was not present. The pupils were equal and react normally. No nystagmus; normal visual acuity; no modification of the visual field, in particular no hemianopsia; speech slow; the labials especially difficult.

There was no difficulty with deglutition. Following a violent emotion the patient presented mutism almost absolute for four days. The cheeks were flabby and mastication painful.

The diagnosis was immediate peripheral facial diplegia of traumatic origin with left labyrinth concussion and rupture of the tympanic membranes with double consecutive suppurative otitis with deafness on the left side.

The diagnosis of traumatic and organic facial diplegia will be almost always easy. It will not be difficult to recognize that it must be related to a peripheral injury, the seat of which within the petrous bone, will be determined by the symptoms carefully analyzed and by the signs associated with fracture of the petrous bones and disturbances more or less marked of the part of the eighth pair.

After a concussion, a shock followed by loss of consciousness and the absence of external injuries, the question of a hysterical or functional diplegia must be considered. The absence of disturbance of the electric reactions, the integrity of the MacCarty and corneal reflexes, the absence of the sign of Négro, paresis rather than true paralysis, the almost absolute integrity of the superior facial region, the absence of muscular hypotonia are of help to establish the diagnosis of hysterical diplegia.

Finally, in the cephalic tetanus of Rose, we may look for a toxic infectious tetanus facial diplegia, the origin of which could be ignored and connected with the traumatism itself. It is there that the appearance of the slightest tetanus must be watched, for the difficulties of deglutition and the painful intermittent contractions, in order not to fail to give the patient the benefit of an intensive preventive treatment.

The treatment of traumatic facial diplegia is connected naturally with that of simple paralysis; it can be purely physiotherapeutic; it may be aided particularly by the galvanic current, associated with the faradic at slow intervals, if the paralysis is accompanied by R. D. partly active, and by the gal-

vanic current in the case of R. D. partially pronounced, or of R. D. total.

In general, the functional prognosis remains serious, and the question of surgical intervention should be considered finally, whether a direct operation on the nerve, whether liberation or anastomosis (Moure), or an operation on the soft parts, following the technic of Morestin, to try to correct the total paralysis of the face so apparent and so painful to the patient.

A New Method of Examination of the Vestibular Labyrinth.

MOURE.

Rev. de laryngol., etc., Paris, 1916—August 31.

Moure describes a simple and novel method for testing out the labyrinthine function, employed because of its convenience in tests made on the French soldiers. It is based on a principle contained in a game of children, which consists in turning around a number of times with the head bent over to touch a cane and with the eyes closed. If a person with normal hearing does this five or six times, the feet being kept close together, and then suddenly stops, raises the head and opens the eyes, it will be impossible for him to walk straight forward. He will always take a step in the direction opposite to the first foot employed—that is to say, if the first step is taken with the left foot he will fall or step forward toward the right, and vice versa, if the first step is taken with the right foot he will fall or step toward the left.

In the hypoexcited labyrinth the amount of deviation will be more or less reduced, according to the degree of labyrinthine involvement, until in the totally dead labyrinth the patient will have no difficulty in walking directly forward. In case the labyrinth is hyperexcited it will be necessary to do the turning with less vigor and a fewer number of times. The normal reaction will be correspondingly intensified.

Harris.

Otosclerosis.

FREDERICK, M. W.

N. York M. J., 1918—CVII—153.

The writer acknowledges at the onset that nothing new in the way of therapeutics has been achieved, and although

he has nothing new to present he feels no hesitancy in bringing it before the profession. In this way he hopes to stimulate the younger men to take up this study and pursue it to some beneficent end.

Concerning the pathogenesis: this seems to be the most important part of the subject, since the therapeutics depends upon the pathology. Unfortunately the majority of the cases have been microscopically doubtful, as they have occurred in old people in whom bone and nerve changes are apt to be present. This again emphasizes the importance of recognizing the disease in its early stages and of examining histologically the petrous bones of those showing signs of otosclerosis and of those young people in whose families otosclerosis has occurred but who have presented no clinical symptoms in themselves.

There are three well defined views as to the pathogenesis. Politzer thinks the disease begins in the bony labyrinth but denies that the bone islands are spongiosa. Siebenmann believes that the disease originates in the bone and that the bone islands are spongiosa. Habermann found compact as well as spongy bone and places the process in the periosteum. Since the disease comes on so insidiously and manifests itself only after serious functional changes have taken place with so few local causative changes and such a decided hereditary feature, it is not to be wondered at that most of the constitutional dyscrasias have been accused plus a local predilection. Syphilis has been blamed by many and denied by others. Habermann after a thorough study is convinced of the causal relation between otosclerosis and syphilis. Later investigations have proven this to be untrue. First—Because the aural affection does not occur in proportion to the number of syphilitics. Second—Men are more frequently infected with syphilis than women, while otosclerosis is especially a disease of the female sex, and third, the Wassermann reaction invariably gives results which speak against leutic etiology. The author nevertheless sees a causal connection between otosclerosis and syphilis in spite of the absence of other stigmata of hereditary syphilis, negative Wassermann tests and the negative value of antisymphilitic medication. He considers the bone changes in otosclerosis identical with the bone changes in syphilis. Nager and Alexander are both quoted—showing that

middle ear affections in congenital syphilis as in other severe constitutional derangements show a marked tendency to break into the labyrinth. Otosclerosis is a disease which becomes apparent as a rule in the second and third decenium and it is a well known fact that the Wassermann test is frequently negative in congenital syphilis—over twenty years of age.

The proponents of the congenital syphilis theory hold that otosclerosis is a highly attenuated form of lues and that the inefficiency of antiluetic treatment is due to its being used too late to do any good. Many authors insist on the marked vulnerability of the acoustic nerve from all kinds of noxa, and that such a searching virus as syphilis should find this easily wounded member is no surprise. This explains the nerve affection—to explain the osteospongiosis he quotes from Brooks' textbook of pathology. In congenital syphilis there is a pathognomonic change of the chondroosseous junction. An osteochondritis syphilitica is frequently observed which appears as a yellow white line at the epiphyseodiaphyseal junction. This line corresponds in its position to the zone of provisional calcifications. In healthy children the latter forms a very small, scarcely visible line of demarcation between the epiphysis and the diaphysis. This small line is transformed by hereditary syphilis into a broad, distinctly visible line which consists of calcified but dead cartilaginous tissue for the calcification occurring in syphilis in a definite variety, a kind of petrification which corresponds to a necrotic process. The dead cartilage excites proliferation in the neighborhood which under certain circumstances may lead to complete dissection of the cartilage from the bone so that a kind of fissure is formed between them.

This picture is easily recognized in many of the temporal bones of otosclerosis.

He presents nothing new for diagnosis and therapeutically feels that up to the present time nothing really worth while has been brought forth that merits our attention. Radium has proven itself valueless. The noises are temporarily lessened, which is explained by the selective action of the radium which attacks nerve elements furthest below par, and put them out of commission for a time, but when they recover the noises return, which perhaps also explains the temporary improve-

ment in hearing. The major operation of resection of the acoustic for the relief of extensive head noises is no longer necessary, if the patient is willing to accept complete deafness, as this can easily be brought about by radium without the slightest danger to the general health. Several applications of a strong pencil—2-3 mgm.—for a period up to forty minutes will entirely destroy the terminal acoustic without injury to the surrounding tissue. The most important thing in otosclerosis today is the prophylactic side, into which the author goes extensively.

Ira Frank.

Mastoiditis.

HUNTINGTON, WM. H.

Med. Rec., New York, May 18, 1918.

Summarizing the conditions which would indicate the simple mastoid operation, we find:

1. Cases of acute mastoiditis, with persistent pain on pressure over the tip or antrum. Persistence of fever after a successful paracentesis has been done or in which we find a sagging of the posterior superior meatal wall.
2. Cases of acute suppuration of the middle ear, with dizziness, vomiting, nausea or beginning facial paralysis, or with signs of intracranial or labyrinthian involvement.
3. Cases of long standing middle ear suppuration which resist all local measures, and because of good hearing and other reasons do not indicate a radical mastoid.
4. Cases of persistent mastoid pain, either with or without other symptoms, which cannot be accounted for in other ways.
5. Cases of subperiosteal abscess.

Emil Mayer.

A Case of Otitic Thrombophlebitis With Pyemia, Accompanied by Gradenigo's Syndrome; Operation; Recovery.

C. CALDERA.

Arch. ital. d. otol., etc., Napoli, 1918—XXVIII—321.

An artilleryman who entered hospital with the complaint of otitis had suffered for twenty days. Otoscopic exam-

ination showed copious discharge of pus in the left auditory canal and the tympanic membrane red and bulging. There was pain in mastoid region. Ichthyol was used with no improvement. Severe pain continued; temperature, 39.2° C., rising to 40.9° C. Operation August 24, 1917: Morphin chloroform anesthesia. Mastoid cells being opened were found full of creamy pus and granulations. Lateral sinus was laid open for the distance of a centimeter; thrombosis could not be established, and it was decided to wait and perform a second operation. Iodoform gauze dressing. For the next four days the pyemic character of temperature was maintained, oscillations being between 37.8° and 40.4° C. August 29th it was decided to open the sinus, which was uncovered upward toward the torcular Herophilli and downward toward the bulb, in all for a distance of three centimeters, exposing the mastoid emissary vein. The thrombus thus laid bare, was found filling the lumen of the sinus. The thrombus was removed with a spoon and the sinus curetted. Iodoform gauze dressing. Daily endomuscular injections of six cubic centimeters of phenol, injections of four cubic centimeters of 20 per cent camphorated oil and later endovenous injections of electrargol in doses of five to ten cubic centimeters. Patient gradually improved, pain disappeared and finally recovered.

Grave Complications of Suppurative Otitis.

BRINDEL.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—1.

In civil life the practitioner who is not familiar with the grave possibilities of suppurative otitis is inclined to indifference toward it, and the patient readily takes the same attitude, being averse to operation or radical treatment by an aurist for a painless and apparently trivial ailment. On the other hand, the soldier, for various reasons, willingly submits himself for treatment; indeed he may complain of his ear trouble to avoid being sent to the front or to procure his evacuation. At the military otologic hospital in Besancon, Brindel states that in a year 3,100 patients were examined and 1,550 ad-

mitted. Of the 3,100 examined, 800 were sent in because of an ear discharge—350 acute, 450 chronic. One hundred and eight of the 800 required operation for mastoid complications—78 from acute otitis and 30 from chronic otitis with acute recurrences. Ten of the 108 cases were extremely grave, and to these the writer devotes the greater part of his paper. Summarized, the ten cases were as follows:

1. Cerebrospinal meningitis (meningococcal) complicating a streptococcic meningitis of otitic origin, in the course of an acute suppurative otitis media, with latent mastoid osteomyelitis. Fatal.

2. Meningitis of a cerebrospinal character, but without the meningococcus; acute suppurative otitis media with no mastoid involvement. Fatal.

3. Otogenous meningitis with multiple foci in a case of recurring otorrhea. Three operations (simple, radical, exploration of lateral sinus). Recovery.

4. Acute generalized meningitis following acute suppurative otitis media, aggravated by erysipelas. Fatal.

5. Acute generalized meningitis following acute suppurative otitis media of grippal origin. Mastoid operation in two stages. Fatal.

6. Probable cerebral abscess. Old suppuration, middle ear. Mastoid operation; cholesteatoma, extensive destruction of antral roof. Death from superacute meningitis due probably to rupture of an abscess under the meninges.

7. Chronic recurring otorrhea. Acute mastoiditis with extradural abscess. Pyemia. Radical operation. Death in three days from purulent infection.

8. Old recurring otorrhea. Labyrinthitis. Radical operation, opening of labyrinth. Recovery.

9. Subacute suppurative otitis media following a Valsalva. Mastoiditis; extradural abscess. Mastoid operation. Recovery.

10. Old recurring otorrhea. Signs of phlebitis of the sinus, with cerebral symptoms. Radical operation, arrest of infective process, cure.

From these ten cases Brindel concludes:

Intracranial complications of suppurative otitis are very dangerous, and surgery is more efficacious as a preventive than as a cure.

Half of these complications could be avoided by treatment of chronic suppurations; a good part of the other half would not occur with radical and complete operation as soon as mastoiditis threatened.

Erysipelas in the course of acute suppurative otitis exalts the virulence of pathogenic germs and favors the onset of meningitis.

A discharge from the ear may be the cause—if not determining, at least occasional—of cerebrospinal meningitis.

A. Miller.

Case of Posterior Mastoid Cellulitis; External Fistula; Extradural Abscess.

ROZIER.

Revue de laryngol., etc., Paris, 1917—XXXVIII—105.

A soldier, thirty-three years old, following an acute otitis media with profuse discharge two months previously, developed an abscess about three centimeters behind the external meatus. This was incised at the evacuation hospital. The wound continued to suppurate profusely, and the patient was sent to a central-otologic hospital. Here the wound was reopened and a small fistula near the parietooccipital suture was found. On trepanation a considerable area of the internal table was seen to be destroyed and the sinus wall was reddened and covered with a fungous mass. The affected area was separated from the normal antrum by thick healthy bone. Aberrant mastoid cells have previously been described by Moure (1901), Richard, Lermoyez and others. The posterior cells seem to occur in three groups: (1) Posterosuperior, comprising the cells of the posterosuperior angle of the mastoid, near the parietal, and in relation to the cranial cavity, meninges and angle of the lateral sinus. (2) Posterior mastoid cells, on a level with the antrum, extending to the sigmoid fossa, and even to the occipital suture. (3) Posteroinferior, near the digastric fossa, and along the lower portion of the sinus.

A. Miller.

Measuring Perception of Two Successive Sounds.

MAURICE.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—129.

Opinion is general that persons with impaired hearing have retarded perception to some degree. It is this retardation which obliges us to speak to them very slowly, and which causes them sometimes to ask for the repetition of a question but respond to it before it can be repeated. Richet and Galle found that the normal ear could distinguish articulate language if the rate of emission was below ten or twelve syllables per second. Escat has prepared a series of test words to be used in testing the rapidity of perception, but the plan has certain obvious disadvantages. Maurice's apparatus consists in essence of a telephone in which sound is made and stopped, respectively, by means of two weights set to fall from various heights, and the usual revolving drum and stylet for recording time intervals. With this instrument Maurice has found that ears considered normal appreciate two sounds at an interval of five to ten thousandths of a second, while in the deaf the time may be increased to forty or even sixty thousandths of a second.

A. Miller.

War Injuries of the Ear.

MOURE AND PIETRI.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—154 and 186.

An endeavor is made to answer the question: "What shall be done by the examining surgeon in cases of trauma of the auditory apparatus?" These cases comprise: (1) Deafness from a lesion of the transmitting apparatus, in which event it should be determined whether it is a result of the wound or existed prior thereto; (2) deafness without any objective lesion of the ear; (3) deafness due to injury of both transmitting and receiving apparatus; (4) injury to the receiving apparatus with previously existing impairment of transmission. Especially must be determined the psychic element and the factor of exaggeration in each of these classes, especially

the last three. Accordingly, the auditors describe the various tests for audition and equilibration, including cranial perception of the watch, auditory perception of watch and voice, the Weber, Rinné and Galton, transmission by general sensibility, tests with the deafener; spontaneous nystagmus excited by rotation temperature (hot and cold water), and the Moure test, static test, galvanism, etc. Normal and abnormal reactions are compared. The authors carefully describe cerebral (psychic) deafness, simulation and exaggeration. The two latter are to be distinguished from each other, exaggeration being more common than actual simulation. In cerebral deafness the patient is apathetic, slow of gait, automaton-like, answers questions in monosyllables or not at all, and avoids the direct gaze of the observer. The really deaf, on the other hand, watches the lips, is alert and on the whole just the opposite of the cerebral type. The exaggerator seeks to exploit his aural pathology by pretending that it is more than it actually is, and overplays his hand. The simulator is rather easily detected by discrepancies in the results of the various tests, notably the Rinné and Weber, their combination with the artificial deafener, pretended stopping of the ear with a canalized rubber tip such as is used in tubal catheterization, and pinching one or the other branch of the binauricular tube. Dundas Grant has observed that if a shrill sound (whistle) is perceived the pupils first narrow, then dilate; when the sound is no longer heard the pupils again contract to normal. This test is of obvious use. The Lombard deafening test causes the subject to raise his voice in answering questions: in complete bilateral labyrinthine deafness the voice will not be changed by this procedure. A. Miller.

New Apparatus Using Hot and Cold Air for Evoking Rhythmic Nystagmus.

ROZIER.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—241.

In using cold and hot water for testing the integrity of the labyrinth, vertigo, vomiting and syncope are nearly always induced. This is objectionable, especially in examining wounded soldiers. Dundas Grant has employed air instead of water.

using a coil of copper tubing, cooling the coil with ethyl chlorid, and forcing air through the tube into the ear by means of a thermocautery bulb. Ethyl chlorid is expensive and difficult to procure in these times, so Rozier, using apparatus similar to that of Grant, cools the coil with ice and warms it with hot water (42 or 44 degrees Centigrade). The nystagmus produced is satisfactory for testing, and there is no vertigo, vomiting or syncope.

A. Miller.

**Suppurative Otitis Media Complicated by Cerebral Abscess and
Suppurative Meningitis; Autopsy.**

CHALMETTE.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—25.

A soldier, twenty-six years of age, was stunned by a shell. He did not lose consciousness, but had a right otorrhagia. He was evacuated and later a suppurative otitis developed. On being sent to the trenches again he complained of headache and impaired vision, and was again evacuated. At this time he was found still to have a suppurative otitis, for which he was treated by lavage, etc., for a month. Then operation on the mastoid was done, the antral walls being found smooth and firm, without fistulæ or sequestra. Two days afterward the patient's temperature rose and he complained of severe right sided headache, especially at the vertex; the pulse was slow (64 to 66), but no paralysis was noted. After a few days decided cerebral symptoms developed and culminated in attacks of Jacksonian epilepsy. Cerebral abscess was diagnosed and trepanation above the meatus was done. The dura was somewhat yellowish, but on opening it only clear cephalorachidian fluid escaped. Four punctures into the parenchyma failed to find pus. The symptoms then abated for a few hours, then recurred. Again exploratory punctures into the parenchyma were without result, and death occurred within a few days. At autopsy pus was found under the right dura, and there was a small abscess cavity in the first temporal convolution, behind the site of trepanation.

A. Miller.

II.—NOSE.

Influenzal Sinus Disease and Its Relation to Epidemic Influenza.

ROBERTSON, H. E.

J. Am. M. Ass., Chicago, 1918—LXX—1533.

1. Epidemics of respiratory influenza (purulent tracheobronchitis) have been fairly severe in both the American and the British Expeditionary forces.

2. In the investigation of cases, both clinically and at post-mortem, little attention in the past has been given to the question of accompanying sinus disease.

3. Of eight fatal cases of purulent tracheobronchitis due to the influenza bacillus, all but one showed involvement of one or more of the sinuses at the base of the skull by inflammatory processes, probably in all cases, directly due to the invasion of these sinuses by the influenza bacillus.

4. In six patients that died from some other apparently independent infection, the sinuses showed influenzal inflammations.

5. Of two patients dying from accidentally received injuries, both harbored in their sinuses lesions giving pure cultures of bacillus influenzae.

6. Appropriate treatment of the sinuses in patients suffering from influenza often served to relieve the symptoms and apparently to hasten convalescence.

7. Investigation of the sinuses during epidemics of influenza is strongly recommended, and urged not only on therapeutic but also on prophylactic grounds. Emil Mayer.

Nasal Reconstruction, With a Note on Nature's Plastic Surgery.

AYMARD, J. L.

Lancet, London, 1917—888.

The greatest difficulty presenting itself is when the nose has been destroyed by war injury and the scar tissue surrounding the lost organ has to be utilized for the junction of the new flap. The most common cause of failure is probably due to the fact that the nasal cavity is not an ideal aseptic one any time,

but rendered much more unhealthy owing to the inevitable damage to one or more of the sinuses and their surrounding tissue. We are warned that the cause of failure is often due to undue haste, so the fact is emphasized that no plastic operation of any kind can possibly suffer through reasonable delay.

The following principles of nasal construction are given as essential: The flap should be taken, if possible, from the site likely to lead to the least ultimate disfigurement; the lining of the flap should take some other form than scar tissue; the new organ should as much as possible correspond with the original; the supporting framework should as closely as possible simulate the original; the bed area for the new organ should be most carefully prepared.

The author is using a new method, taking a long pedicle flap with its base near one clavicle and forming the nose upon the chest on the opposite side, keeping the head slightly bent upon the chest for fourteen days. Cartilage is formed by this time in the supporting framework for the following reasons: It will attach itself to bone exactly as bone will to bone, and the resistance of cartilage to mild sepsis is an argument in its favor, and furthermore, cartilage remains constant, whereas bone unattached is prone to disappear. Some of the common sources of trouble are dacryocystitis, antrums sequestra, portions of nasal bones embedded in the cheeks and the condition of the patient's teeth. Concerning the removal of costal cartilage, the surgeon should first remove the costal cartilage and clean up the wound before proceeding to the head work, or an independent surgeon should do this part.

Ira Frank.

Ozena Among the Various Races of the Earth.

Roy, J. N.

Laryngoscope, St. Louis, 1917—XXVII—679.

The people of the earth are divided from the ethnologic standpoint into three families: white, red, and yellow, the Malays and redskins being represented in the Mongolian race.

Little is said in the article about the white race, as so much

has already been published. Some conclusions, however, are observed in cross breeds with the other races.

Careful study was made of the black race in Africa, America and Oceania. The nasal cavities of some five thousand negroes in twenty-two different colonies were observed, and the conclusion drawn that they do not suffer from ozena. A particular study was made of the nonpure races whose ancestors were Egyptians, Arabic, or so forth, in whose veins there was a certain quantity of Mongolian blood. There was little or no atrophic rhinitis. It was also unknown among the negroes in Oceania and the West Indies, but in returning to America three-quarters of the population of the black race were afflicted with this disease. The yellow race of Asia predisposed to atrophic rhinitis not only in the Chinese and Japanese but in the cross breeds as well. The frequency of the disease varies according to the condition, and the author has written a very interesting article in explanation of this. He has come to the conclusion that ozena is an infectious disease and is found in all races, less frequent in the black than among the whites, and most prevalent in the yellow race.

J. M. Shefferd.

Broken Noses, Their Pathology and Treatment.

CARTER, WILLIAM WESLEY.

Med. Rec., New York, 1918—XCIII—940.

He now performs a submucous operation, leaving a fair amount of cartilage along the upper margin of the septum to reinforce the bridge, which he constructs by transplanting bone after the recovery of the patient from the submucous operation and the bridge splint operation, which are done at one sitting. In applying the bridge splint in these cases it is absolutely necessary to mobilize completely the broken parts of the nasal arch, and in addition to this to remove all of the scar tissue that is accessible and utilize the nasal processes of the superior maxillæ, which are chiseled off from their attachment by means of a special chisel applied from within the nose. The dorsum of the nose is then easily raised to a normal position by means of the bridge splint, which holds it in position for about two weeks. At the end of this time the

nose has apparently been perfectly restored, and it has been, but not permanently, as experience has now shown. The contraction of the large amount of scar tissue, which is invariably present in such a nose, depresses the bridge, and within a few months the deformity is as bad as ever. He now prevents the return of the original deformity by transplanting bone and cartilage from the rib immediately after the patient has recovered from the bridge splint and submucous operation. The splendid restoration of the nose effected by the bridge splint is thus made permanent by the support of the transplanted bone.

The results secured by this combined, two stage operation have been excellent, and he is quite sure that they are permanent, as a sufficient time has elapsed to show. All of the work is done from within the nose and no operative scar results.

An extensive experience in this work convinces him that the rib is best suited for transplantation into the nose. In those cases where there is also a drooping of the tip, and it is necessary to extend the supporting transplant nearly to the end of the nose, he takes a transplant from the rib where it joins the costal cartilage; the upper two-thirds is composed of bone and the lower third of cartilage. The normal structure of the nasal bridge is thus restored and the flexibility of the tip is unimpaired.

The procedures here advocated for the treatment of traumatic nasal deformities and obstructions have been thoroughly tested in a large number of cases; there have been no serious accidents and the patients have been relieved.

Emil Mayer.

Ozena Is Not a Specific Microbial Disease.

DUVERGES, J.

Rev. de laryngol., etc., Paris, 1918—XXXIX—1.

Ozena is a local tropical affection, easily cured, and dependent on two factors: (1) The general condition of the patient. (2) The condition of his nasal respiratory function.

In certain affections where the nose has been cleared out, a few days after the operation a true ozena appears. It is difficult to believe that the patient could be attacked by a specific

bacterium necessary to form the crust and the odor, especially since a slow evolution characterizes ozena. It is more logical to suppose that this new pathologic state was the result of a new condition. A person with a nasal obstruction, suddenly having large nasal cavities, does not know how to breathe through his nose; and the secretions which are not drained form into crusts subject to all the microbic flora of the nasal cavities (odor).

No case of ozena resists the strict treatment following, even if it has persisted for twenty years.

Treatment.—The author's treatment differs radically from that of Robert Foy, who was the initiator of the reeducative method.

1. One of the bases of treatment is the freedom from all washing in spite of the pain.

2. To relieve the severe pain a vibratory massage should be used once or twice a day for the first few days to free the cavity from the crusts.

3. When the nasal reeducation is undertaken the patient should as often as possible inhale, deeply and slowly, with his mouth closed, and then to exhale in the same way. The rest of the time he must keep his mouth closed. However, this daily reeducation is insufficient to obtain a cure for ozena. Nocturnal reeducation is essential. To force the patient to breathe through his nose at night, he must wear a mask which will hold the mouth closed.

4. To relieve the pain during the first days and to get rid of the crusts between massages, the best method is to use inhalation and sprays of oil of vaseline with small quantities of chloretone, menthol and eucalyptol.

5. The last point of the treatment concerns the general condition. This varies according to the disease (scrofula, syphilis, anemia, etc.). It may be necessary to use arsenic, iodotannic preparations, etc. Exercise is advised that develops the lung capacity and thoracic amplitude.

In general, if the reeducation is methodically practiced, the crusts will be considerably diminished in five or six days. At the end of the second month, sometimes before, there is no trace of crusts, there is a frequent almost watery discharge from the nose, the odor has disappeared.

At the end of the third month, sometimes at the end of the second, the patients are seen only once every six weeks to report on their condition and to assure us that reeducation is being practiced regularly. The patients who have followed the treatment are entirely cured at the end of a year.

III.—PHARYNX AND MOUTH.

Observations on Some Facial Deformities in Soldiers Repatriated From Germany.

PONT.

Lyon méd., 1918—CXXVII—84.

1. Wounded February 22, 1916. Repatriated July 12, 1917. Diagnosis: Loss of substance of the lower lip and mental region, incompletely covered by six autoplasties. The buccal orifice is elliptic, and the greatest occlusion leaves a space of about two centimeters between the lips. Complete absence of the chin caused by loss of the underlying bony structure. Comminuted fracture of the lower jaw at the level of the symphysis, with loss of bone extending from the first right molar to the first left. The two stumps of the horizontal branch are deviated to the side of the tongue and prevent the movement of that organ. The upper maxilla was likewise fractured, the fragments having reunited in a bad position under the influence of the cicatricial bridges of the lip and jaw. The upper dental arch has the form of a V, the summit corresponding to the left first premolar. The patient constantly dripped saliva and had to wear a bib. He stated that he had worn a prosthesis composed of an arch and two rings, one of which is still in place. The teeth to which they were attached having become abscessed, the arch was removed, so that the reduction obtained was nullified. Remnants of roots of teeth causing intense gingivitis. As a result of absence of mastication and constant loss of saliva, the general condition of the patient was very bad. Treatment: Replacement of the bony fragments, to be followed by plastic.

2. Wounded May 19, 1916. Examination showed a double fracture of the inferior maxilla at the level of the first molars,

right and left, with loss of bony substance, and consecutive double pseudoarthrosis. The intermediate fragment is loose and is slightly retracted from its normal position, while the ascending rami are drawn upwards by the action of the pterygomasseter band.

The patient stated he had received an apparatus to hold the bones in position, but it did not fit and caused pain. It was removed in forty-eight hours and no further treatment given.

3. Wounded October 1, 1914. Repatriated September 5, 1917. Transfixion of the face by a ball entering on the left side at the level of the free border of the lower lip near the commissure and leaving on the right at the level of the angle of the jaw. Fracture of the lower incisors and lower jaw at the region of the molars. Fractures not reunited, pseudoarthrosis at the angle of the jaw. Loss of thirteen teeth in the lower jaw.

4. Wounded August 22, 1914. Repatriated June 30, 1917. The projectile entered the left zygomatic arch, which it fractured, and having traversed the face, made its exit behind the right sternocleidomastoid at the junction of the middle and upper thirds. Depression at entrance and adherence of bone to skin. Complete constriction of the jaws, with opening of less than one millimeter. Complete absence of mastication and movement lower jaw. He had undergone six operations without benefit.

5. Wounded October 6, 1915. Repatriated December 9, 1916. Comminuted fracture of the nasal bones with obliteration of dorsal aspect. Complete atresia of nostrils, which are completely obstructed.

Nasopharyngeal Hemorrhage, After Concussion from Shell Explosion in a Patient Affected with Arterial Hypertension.

CROUZON, O.

Bull. et mem. Soc. méd. d. hôp. de Paris, 1916—3, S., XL—
1376-1378.

Crouzon reports a case of a man who was subjected to the circumstances of an intensive bombardment. He was very much fatigued, for he had not been in bed for nearly two weeks and had been subjected to a gas attack without having

a mask. At seven o'clock in the morning of his attack, a large shell exploded in the parapet where he was. He felt at the time a sensation of compression, followed immediately by one of expansion, and suddenly he was taken with hemorrhage from the nose and pharynx without any contusion having taken place. He coughed blood from the nose and mouth in large quantities, and it was not arrested for about two hours. The hemorrhage recommenced two or three hours later. While he was being taken away in the ambulance a gun bombardment occurred, and then the hemorrhage reappeared. In the train the hemorrhage continued until ten hours after it began. During the following three weeks he had two attacks. There were no changes of his visual field of organic character. According to the observation of the writer, the vascular condition prepared the ground for the effects of the commotion.

The Nose and Throat in Cervical Adenitis.

WOOD, GEORGE B.

N. York State J. M., 1918—XVIII—3.

The majority of cases of chronic cervical adenopathy are of the descending type. They usually begin with enlargement of the tonsillar lymph node. The next most important group has its starting point in the upper glands of the external group of the deep cervical chain placed just behind the posterior border of the sternomastoid. The chronic form of adenitis rarely begins with primary enlargement of the superficial chain. Practically the only direct afferent vessels running to the deep cervical chain come from some part of the upper digestive and respiratory apparatus, hence the importance of the mouth, nose and throat in the etiology of cervical adenopathy.

If the glands involved begin with those under the posterior portion of the sternomastoid muscle we can rule out the tonsils and mouth, and in the large majority of these cases the infection comes through the pharyngeal tonsil. Second, alveolar infections involve primarily the posterior gland of the submaxillary group, and where the tonsillar lymph node is primarily enlarged the infection almost surely comes through the faucial or lingual tonsils or possibly the lateral folds of the pharynx.

Emil Mayer.

Sarcoma of the Soft Palate.

VOORHES, B. G.

Laryngoscope, St. Louis, 1917—XXVII—632.

Patient, girl, aged ten years. Immediate family history negative; grandmother on father's side and three aunts on mother's side dead. Patient operated upon by family physician March 29, 1916 for adenoids. June 12, 1916, patient consulted the author for growth in the soft palate. She was suffering from dysphasia, anorexia, dyspnea, mouth breathing, loss of weight, slight rise of temperature, no pain, no chill.

Enlarged gland on outside of sternomastoid muscle about the size of an English walnut, hard, irregular, and freely movable. Postnasal space entirely shut off, mass about the size of a hen's egg extending from the soft palate down into the throat, tender to touch. X-ray report was abscess. Upon this report it was opened by a throat specialist about ten days before seen by the author, at which time he made an exploratory incision and introduced a curved hemostat laterally and downward, but no pus was obtained; bleeding was free, consistency soft, having the feeling of honeycomb. Diagnosis at operation, sarcoma; prognosis given as poor. Patient died July 18th. Laboratory report, spindle cell sarcoma.

J. M. Shefferd.

The Treatment of Cancer of the Lip by Radium—A Report of Twenty-four Cases.

JANEWAY, HENRY H.

J. Am. M. Ass., Chicago, 1918—LXX—1051.

The degree of success obtained in the treatment of operable cancer of the lip by radium in the series of cases reported and the maintenance to date with such regularity of the healed condition in earlier cases treated justifies a continuation of the use of radium in operable cancer of the lip. It may be that the lapse of time will require some modification of this judgment. This method of treatment includes the careful observation of the patients after treatment for the possible development of metastatic lymph nodes, and the operative removal of such when they occur, with the implantation of radium in

the wound. The treatment of cancer of the lip by radium should encourage earlier attention to this disease by the patient.

The application of radium emanation embedded in molds of the dental compound is recommended and filtered through the thinnest material for the most superficial lesions. As a matter of convenience we have used 0.5 millimeters of silver uniformly for all but the lesions with deep infiltration. While 0.5 millimeter of silver has been unnecessarily heavy for the most superficial lesions, it has given uniformly satisfactory results in our cases. For the deeper lesions, however, nothing has surpassed the progressive, smooth and complete retrogression produced by filtration through one millimeter of platinum. The tubes should be sunk five millimeters in the dental compound, and for the ordinary lesion the dose should be sixty millicurie hours per square centimeter, when the filtration is through 0.5 millimeter of silver, and one hundred millicurie hours per centimeter when through one millimeter of platinum.

The use of emanation instead of radium element facilitates uniform distribution over the lesion. Provision for uniform distribution is the most important factor in obtaining a successful result. It is true that it is possible to approach the uniform distribution obtained by emanation with the radium element, provided this is put up in many minute tubes; but few users of radium element find it practical to divide their radium thus, and the attempt to treat these lesions by merely placing on them single tubes of radium element is inaccurate and often inadequate.

The superior adaptability of radium emanation for the treatment of cancer makes the use of the element itself obsolete, and for the vast majority of cancers it is inefficient.

Emil Mayer.

Gonococcus Infection of the Mucous Membrane of the Oral Cavity.

MAYHEW, JOHN MILLS.

J. Am. M. Ass., Chicago, 1918—LXX—1223.

N., a student, aged nineteen years, had always been in good health. He denied venereal disease or recent exposure of any kind. January 2, 1918, he visited a dentist to have his

teeth cleaned. He reported that the dentist was so rough that his mouth bled in several places after the treatment. Within twenty-four hours he had a great deal of pain and a burning sensation in the buccal portion of the lips, and within forty-eight hours his throat was sore. Sixty hours after the treatment his lips were swollen and painful, and vesicles formed at the corners of the mouth. He could not swallow anything but the blandest of liquids, and even warm water hurt his throat severely. Five days from the time of infection he complained of intense pain in the throat and under the tongue; he could hardly move his lips in speaking, they were so swollen.

Examination was difficult, but inflammation of the entire buccal cavity was observed, hemorrhagic areas over the right pillars and velum and a white, clinging exudate over the left velum, cheeks, lower lip, dorsum of the tongue, and oropharynx. On the frenulum of the tongue there was a shallow ulcer with a red base resembling somewhat a mucous patch. The corners of the mouth were cracked and bleeding. The area under the exudate on the lips bled when the membrane was raised. The tongue was swollen and showed an exudate on the dorsal surface. The whole picture presented a most severe type of mouth infection. The submaxillary glands were swollen and tender; the cervical chains were negative. The temperature was 100.2° ; the pulse, 110. The patient felt and looked very ill. Serum from the ulcer on the frenulum was examined with the dark field illuminator, and by means of India ink smears for the spirocheta pallida, but none were found. Specimens were taken from different parts of the mouth and were examined, especially for Vincent's spirochete, the fusiform bacillus, and fungi. Smears made from the pus revealed gram negative, biscuit-shaped diplococci, both intracellular and extracellular. A large number were crowded in some of the leukocytes, one containing fourteen pairs. This organism grew slowly on ascitic fluid, hydrocele and blood serum-glycerin-glucose-agar, and did not grow on the simple cultural mediums at 37° C. It was agglutinated by serum from a known gonorrheal blood. Complement fixation for gonorrhea was negative, but since this is usually the case in acute gonorrhea, not much value is put on this test.

The patient was sent to the hospital, isolated, and treated

with a mouth wash of a saturated solution of thymol. The mouth and throat were swabbed twice daily with a two per cent silver nitrate solution. The exudate increased rapidly, covering the roof of the mouth and the lips and evading the tonsils, but appearing on the pharynx by the morning of the following day, the eighth after infection. In forty-eight hours after treatment was instituted the exudate began to disappear, leaving a raw, bleeding surface, the roof of the mouth clearing first, then the pharynx and lip surfaces in order. The ulcer on the frenulum was the last to heal. At no time was there any odor from the mouth or the secretions expectorated. Smears were negative for the intracellular diplococcus on the twelfth day, and none of the organisms described were found in culture; but the mouth was very sore and, in places, raw, and it bled on slight provocation. The parotids were not painful at any period of the disease, the cervical lymphatics were but slightly tender, and the joints were never disturbed. The nasopharynx mucous membrane and nasal cavities were not infected.

Emil Mayer.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Wounds of the Air Tract and Esophagus.

GLUCK, T.

Ztschr. f. arztl. Fortbild., Jen., 1915—XVI—391-426.

Good results have been obtained by primary suture for tracheal wounds in transverse cuts across the trachea. Eiselsberg recommends circular suture and tracheotomy at the same time. Furthermore, tracheotomy is to be undertaken in gunshot wounds of the larynx, and immediately if the hemorrhage is due to injury of the projecting tissues or cartilage. A deep tracheotomy is to be recommended in complicated wounds where there is much destruction of the soft parts of the cartilage.

The following methods are recommended for cases which cannot be relieved by simple dilatation or which show a marked destruction of the organ which cannot be repaired otherwise.

1. Tracheostomy and laryngostomy, with an artificial larynx scheme. A persistent assurance valve, which makes the wir-

ing of the canula unnecessary in high grade stenosing process of the upper air process, likely to cause danger from asphyxia. A median or elliptical excision is made, splitting the trachea or larynx with the external soft parts. The persistent fissure assures freedom from the dangers of bleeding. A prosthetic appliance, introduced in the form of an artificial larynx with inspiration valve, permits the patient to talk. In most of the cases the patient can speak without the prosthesis.

2. The laryngostomy can be combined with treatment of the lesion by dilatation. By means of the stoma that has been made, the entire scar tissue, which is visible in the opening of the larynx, may be removed and a partial or total laryngoplastic performed, a process which gives good functional end results.

3. Transverse resection of the trachea as far as the arytenoid region, laying the anterior wall of the esophagus bare, with conservation on the recurrent nerves.

4. Closure of deep esophagotracheal fistula by skin plastic.

5. Simple thyrotomy or total laryngofissure and partial or complete exenteration of the epiglottis, or resection of the portion of the cartilaginous framework, following up with total or partial laryngoplastic and formation of a permanent fissure.

6. Besides the partial resection of the trachea, total extirpation of the trachea and of the cricotracheal ligament to the bifurcation, combined with skin plastic.

Importance of Laryngostomy in Wounds of the Larynx.

FERRERI, G.

Riforma méd., Napoli, 1917—XXXIII—643.

Laryngotracheal wounds with more or less loss of substance or of the cartilaginous structure with residual fistulæ, cicatricial stenosis, should be operated only after a certain time has passed and fever has subsided. We must distinguish between immediate intervention for removing splinters, foreign bodies, etc., and late operation, which aims at a permanent cure. In adults more than in children, large excision of the cricoid is indicated in order to obviate secondary stenosis. Before proceeding to a plastic operation the author introduces a rubber tube modeled for each individual, and after a long period

of tolerance leaves the laryngotracheal covering exposed to the air and light for a certain time. When the author is convinced that the tube does not undergo any modifications, he performs a plastic operation. He uses superimposed flaps, the skin of one of which is turned inward, the other lying on it. All cases have been successful by this method.

(1) Further Reports on the Treatment of Malignant Disease of the Larynx. (2) Management and Statistics of Malignant

Disease of the Upper Respiratory Tract.

Laryngoscope, St. Louis, 1918—XXVIII—131 and 135.

(1) Beck contributes a paper upon this subject and prefaces the statement to his report that in 1916 there was as yet no specific treatment or cure for this terrible affliction and that surgical treatment gave the only chance, if done thoroughly and immediately after an early diagnosis. Methods other than surgical were described, such as diathermia, deep penetration of the Roentgen ray, and the Percy coagulation treatment. He stated at that time that Roentgen rays, aided by diathermia, caused marked changes and often disappearance of the growth, which later would recur and terminate fatally; with radium in the dosage of ten milligrams pure there was no appreciable change, but that the Percy coagulation method promised more than Roentgen rays or radium.

Since laryngectomy is associated with considerable risk to the patient's life from complications, such as shock, pneumonia and mediastinitis, Beck has developed the technic of laryngeal fissure and removal of the neoplasm according to the Percy coagulation method. He has employed it for carcinomata and sarcomata of the nose, carcinomata of the jaw, thyroid gland, external ear and larynx—in all, twenty-three cases.

The method was used in four cases of carcinomata of the larynx, and the reasons given for substituting a laryngectomy and removal of the growth by the Percy method for a laryngectomy are: (1) The patient will consent more readily to an operation when he may be promised that he may have a voice, even though it will not be normal. (2) He may even hope to have a normal breathing tube and not have to wear a

permanent tracheotomy tube. (3) The operation is not as dangerous as a laryngectomy.

(2) In the management and statistics of malignant disease of the upper respiratory tract he has complete reports, including the follow-up system in the majority of one hundred and forty-three cases observed and treated since 1895. The sarcomata included the external nose, intranasal including the sinuses, nasopharyngeal, tonsillopharyngeal, alveolopalato, mandibular, lingual, pharyngeal; in all, forty-one cases with eleven deaths.

The carcinomata included external nose, intranasal including the accessory sinuses, alveolopalato, pharyngeal, lingual, and laryngeal; in all, one hundred and two cases, of which seventy-three were followed up to recent date. Twenty-one are still alive and fifty-two died.

In the management of malignant conditions other than the above, Beck further says that there appears to be nothing gained by surgery. Deep X-ray, massive doses of radium, high voltage of diathermia, Finsen rays and salvarsan all have some influence.

Circular Resection and Suture of the Trachea and Plastic Reconstruction of Large Defects of the Trachea.

CHIARI, O.

Monatschr. f. Ohrenh., etc., Berl. u. Wien, 1915—XLIX—
337-338.

Chiari advocates circular resection and suture of the trachea when portions of the trachea and larynx are completely lost through wounds. Care must be taken to avoid injuring the recurrent nerves. The posterior portion of the trachea is sutured with catgut from within outward, while the anterior wall of the trachea is sutured from without with silk. The soft parts and the skin are sutured successively, leaving a small opening for drainage.

If the tracheal defect is so large that the lower stump cannot be moved sufficiently to permit the tracheal margins to be brought together, Gluck's plastic operation must be performed.

Contribution to the Study of War Wounds of the Larynx and Trachea.

RAMONET.

Thèse de Lyon, 1917.

Ramonet divides the lesions of the larynx into two groups:

1. Inflammatory and stenotic lesions.
2. Traumatic and nervous lesions.

1. The inflammatory and stenotic lesions include the following four groups: (a) Laryngitis with infiltration more or less marked; (b) adhesions, cicatrices, loss of substance, and fractures; (c) foreign bodies; (d) laryngostenosis.

2. The nervous traumatic lesions comprise: (a) Nervous aphonia without apparent disturbance of the motility of the cords; (b) laryngeal neurosis; (c) simple recurrent paralysis; (d) associated laryngeal paralyses.

Direct Laryngoscopy in the Treatment of Chronic Postdiphtheritic Laryngotracheal Stenosis.

LYNAH, HENRY LOWNDES.

N. York State J. M., 1918—XVIII—170.

The different types of chronic postdiphtheritic laryngotracheal stenosis should be classified as follows: 1. Neurotic. 2. Spasmodic. 3. Traumatic. 4. Pathologic.

The traumatic types are: (a) Intubational. (b) Tracheotomic. (c) Operative.

The whole of the pathology of postdiphtheritic laryngotracheal stenosis is laid down in the beginning with the acute diphtheritic process. Diphtheria is a dissecting necrotic disease, and upon the duration of the disease and the degree of involvement of the larynx and trachea depend the subsequent changes which occur in these localities. The writer has collected ten cases of laryngeal diphtheria which responded so readily to antitoxin that intubation was never performed. All of these cases became dyspneic from seven to ten days after the primary diphtheritic process had subsided, and all of them required intubation to relieve the stenosis. Some of them were thought to be reinfected by diphtheria, but direct

laryngeal views revealed the ever present subglottic edema. This only goes to prove that upon the degree and duration of the diphtheritic process depends the amount of infiltrative involvement of the laryngeal structures. Nevertheless, the writer feels that while the inevitable nature of the pathologic process plays a very important part in all cases, at the same time traumatism and injury by instrumental means for the relief of the stenosis also add largely as a contributing factor. The writer has classified the pathologic lesions as supraglottic, those above the cords, and infraglottic, to the changes which occur below the cords.

The following pathologic lesions are usually present in the great majority of cases with retained intubational tubes or tracheal canula. (a) Edema. (b) Polypoid masses. (c) Decubitus ulcers; intubational or canula. (d) Paralysis (cricothyroid fixation). (e) Perichondritis. (f) Chondritis. (g) Metaplasia. (h) Endochondral bone formation.

Emil Mayer.

Intratracheal Anesthetic Machine.

ADSON, A. W., AND LITTLE, G. G.

J. Am. Med. Ass., Chicago, 1918—LXX—1746.

The one herein described has been constructed to conform to three principles, as follows:

1. Constant Flow of Air.—A constant flow of air maintained and controlled so that pure air alone, or any degree of ether saturation may be given. This is accomplished by diverting the air current through the valve. If pure air is desired the valve is thrown open to send the air direct without entering the ether chamber. If ether is desired, part of the air current is forced through a tube on the ether surface, where it becomes saturated with ether and escapes through a tube.

2. Ether Tension.—Ether tension is kept constant by the lowering or raising of tubes.

3. Constant Air Pressure.—A safety valve prevents too great pressure within the lungs. This is accomplished by connecting the air current with a mercury manometer.

Emil Mayer.

Transplantation of the Trachea.

BURKET, WALTER C.

Johns Hopkins Hosp. Bull., Baltimore, 1918—XXIX—35.

The author had in view the possible utilization of a tracheal transplant in human cases in which a portion of the trachea had been resected on account of malignant disease. The transplantation of the trachea was done upon dogs. An important factor in the success of the tracheal transplants was the determination of the sterility of the trachea at different levels.

The literature is reviewed, showing that extension work had been done on the healing of tracheal wounds after resection, and the use of various grafts for closing tracheal defects. By far the greater portion of the study had been applied to the treatment of tracheal fistula, by using various material for transplantation. The author divides his experiments into two classes. The main division consisted in the auto- and iso-transplantation of complete annular segments of the trachea in dogs, and a subordinate division, the determination of the sterility at different levels of the trachea of the cat. The experiment relative to the studies with cultures shows the trachea practically in all cases sterile from the larynx to the hilus of the lung. The following experiment in the autotransplantation of the trachea in dogs was made: The animal was etherized by mouth or through a tracheotomy wound. A middle incision was made from the larynx to the suprasternal notch and the muscles separated down to the pretracheal fascia. This fascia contains numerous blood vessels which partly supply the intercartilaginous portion of the trachea. These vessels were ligated and divided only over that portion of the trachea which was to be transplanted. A second important blood supply of the trachea is furnished by a vessel upon either side of the trachea and parallel with it; this was ligated at the point where the trachea was to be divided in order to preserve the circulation of the trachea to the very line of incision. A segment of the trachea composed of from three to nine cartilaginous rings in length was completely separated by a transverse incision and removed. This

autotransplant was then replaced and sutured end to end by using three interrupted black silk sutures placed equidistantly, which picked up the perichondrium and cartilage without penetrating the entire tracheal wall. One short continuous black silk suture was placed in the fibroelastic posterior wall of the trachea. Both ends of the transplant were sutured in the same way.

The operative technic in the cases of the isotracheal transplants was similar to that of the autotransplants. Both animals were operated upon at the same time and the tracheal transplants were interchanged. The tracheal segments from the different sized animals were readily adapted in size to one another because of the anatomic fact that the cartilaginous portion of the tracheal rings was not complete and the posterior wall was formed of fibroelastic tissue. The recovery of the animals from the anesthesia and operation was prompt. The skin wound healed per primam, but after from one to three weeks they developed marked symptoms of tracheal obstruction with dyspnea and died. Autopsy revealed a normal esophagus and lungs and a stricture of the trachea at the site of the transplant. The cases of isotracheal transplants resulted in death, with symptoms similar to the unsuccessful cases of autotransplants, and autopsy showed normal lungs with stricture of the trachea at the region of the transplant.

Microscopic studies of sections made through the anterior and posterior walls of the strictures showed it to consist of a mass of granulation tissue, in the deeper layers of which there were pieces of poorly staining cartilage that were in the process of destruction. The mucous lining was usually absent and the normal relationship of the tracheal layers was destroyed. The successful transplants (three in number) showed no symptoms and gave every evidence that they were as healthy and normal as before operation. Upon exposing the trachea it was found normally mobile, without adhesions, and one could make out by gross examination no reaction in the tissues or structures about the site of the transplant. The life of these perfect transplants—that is, from the date of operation until the animal was sacrificed—was sixty-two, fifty-four and thirty-six days, and the segment transplanted was composed of three, four and seven cartilaginous rings.

Histologically the tissues of the transplant appeared so normal that it was difficult to locate the point of anastomosis, which anastomosis was formed by the tissues of the different layers themselves and not by connective tissue. Epithelium was present everywhere. Scarring was absent, as well as infiltration with lime salts. The cartilage of the transplant stained the same and resembled that of the untransplanted portion of the trachea. The author is of the opinion that the strictures of the trachea that resulted in the unsuccessful case was probably due to the low grade infection and was not sufficiently virulent to cause the skin wound to break down or to infect the lung and that isotracheal transplants resulted in stenosis. In all, ten dogs were operated with three successful results.

Cancer of the Esophagus Developing on a Scar.

DROUIN AND CANUYT.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—218.

Cancer of the esophagus being relatively common, the authors apologize for the publication of this case, but call attention to certain unusual features.

The patient, a man of forty-eight years, one year previously had swallowed some caustic potash by mistake for white wine. At the time of admission he complained of difficulty in swallowing. A sound of large caliber was arrested at thirty centimeters. Esophagoscopy later showed a stenosis at twenty-five centimeters depth, the opening being slightly fungous. Sounds up to thirty-three millimeters were passed, and the stenosis was regarded as purely cicatricial. Two months after this the patient returned because of greatly increased difficulty in swallowing. This time esophagoscopy showed a stenosis, through which a sound was passed, but the patient still could not swallow. Gastrostomy was done. Four days afterward the patient had several violent attacks of coughing and dyspnea, and died suddenly of a profuse hemorrhage. Postmortem the cancer was found to have perforated the left bronchus, also the arch of the aorta, hemorrhage from the latter having caused death. This double perforation is unique. Other odd features are the absence of dyspnea until

late in the disease, the passage of the esophagoscope and large sounds without accident, and absence of symptoms from pressure on the recurrent laryngeal or pneumogastric. As to proving the development of the cancer on the scar left by the caustic, the writers admit difficulty, but naively quote Pierre Delbet's remark that "cancer loves scars." A. Miller.

Stammering.

Med. Rec., New York, 1918—XCIII—800.

PACINI, AUGUST J. P.

The treatment may be divided into three steps:

1. Determine the status of the central nervous system for the purpose of finding a more perfect sense to replace the defective one of the stammerer.

2. Determine the mental type responsible for the stammering defect according to the psychophysics examination suggested.

3. Reeducate the stammerer in a new mental imagery, using any well established reeducation system.

This same routine is brilliantly successful in the prophylaxis of stammering. To this end, it should be carried out in the case of prodromal stammerers, which procedure would result in the abortment of the defect among school children.

Emil Mayer.

Two Cases of Thyrotomy.

BRINDEL.

Rev. de laryngol., etc., Paris, 1918—XXXIX—36.

The advantages are obvious of the simplifying of the operation of thyrotomy by local anesthesia, abandoning of the preliminary, concomitant and often subsequent tracheotomy, the immediate application of the suture to the vocal organ. The intervention is more rapid, and its results are free from respiratory complications. There is even no need, although some operators still advise it, of suturing the plates of the thyroid in transfixing them. There is the risk of cracking them, especially when they are ossified, as is unhappily the case often in adults. It is sufficient to approximate the edges

of them and to fix them in good position, suturing with a fine needle the soft parts which cover the cartilage. Care should be taken to denude the cartilage only at the median line so as to allow the shears to pass, thus minimizing the danger several days later of the installation of a perichondritis on the edges of the cartilage incision and preventing an extension to the thyroïdal plate being made, which retards the cure.

If a block is put under the shoulders of the patient, the head being thus in the half raised position of Rose, it is easy to prevent the blood from flowing into the trachea the moment when the interlaryngeal maneuvers are executed. By taking these precautions the author has been successful with two thyrotomies that he has made in two very dissimilar cases: in the first, the extraction of a piece of shrapnel incrustrated in the internal face of the thyroïdal cartilage; in the second, the extraction of an epitheliomatous tumor occupying the entire right vocal cord with the exclusion of the arytenoidal region.

1. Thyrotomy for Projectiles.—A wounded man came into the service in August, 1915, with a projectile, a round piece of shrapnel, that the X-ray located in the laryngeal region. The projectile entered through the posterior part of the thorax, on the right side. It transversed the internal edge of the lung, the mediastinum from below upwards, without injuring any important organ, and then it lodged under the left plate of the thyroid without fracture and under the anterior part of the vocal cord.

Laryngeal examination was impossible because of the intolerance of the patient, whose voice, slightly hoarse, did not indicate the presence of the foreign body in the interior of the vocal organ. The localization by the X-ray was very poorly established.

Before the patient had entered the author's service, a first tentative examination had been made by a surgeon who had looked for the foreign body in the carotid region without encountering it.

The author made a second fruitless search for the shell fragment outside of the larynx, deceived partly by the X-ray, and partly by the sensation of a little rounded tumor on the external surface of the thyroid, on palpation at a point corresponding apparently to the place indicated by the X-ray.

In the presence of this rebuff, the author examined the larynx. After several attempts and aided by a good cocaineization, a rounded projection was discovered with the laryngoscope, situated at the left side of the larynx near the median line, under the anterior part of the vocal cord. This seemed to be the foreign body, and we decided upon a thyrotomy. Upon opening the thyroid a small metallic surface was observed. The mucous membrane was incised and the ball laid bare; its extraction was simple. Three weeks after the operation the patient, who had had a slight subcutaneous emphysema, but no general symptoms, was completely cured.

2. Thyrotomy for Epithelioma.—A man came from the front with the diagnosis of chronic laryngitis, which was thought due to service. He really had a tumor occupying the length of the right vocal cord, with the exception of the arytenoid. The cord was immovable. There seemed to be no perichondritis.

A thyrotomy was performed with excellent results. For a few days the size of the larynx seemed increased; weeks after the operation everything was in order.

The rapidity of the evolution of the neoplasm gives little hope as to the outcome of any intervention. If there is a recurrence which is produced in fifteen days, it indicates a very great malignity of the neoplasm, although the microscope shows its epitheliomatous nature.

Aphonia of War; Treatment by Reeducation.

LIEBAULT AND CROISSARD.

Rev. de laryngol., etc., Paris—1917—XXXVIII—29.

Four causes of aphonia in war time are recognized: (1) Wounds of the larynx or its nerves; (2) laryngitis—tuberculous, grippal, simple, chronic; (3) mild hypertrophic laryngitis resulting from functional aphonia and due to efforts at phonation; (4) purely nervous aphonia due to shock. The paper deals exhaustively with the two latter classes only. Of prime importance is the fact that there is a constant inverse ratio between the degree of functional aphonia and the fullness of respiration. Accordingly, the patient is carefully examined by inspection, mensuration, the spirometer and the

fluoroscope to determine the character and volume of his respiration. Respiratory reeducation is promoted by gymnastic exercise of the arms, chest and diaphragm. In his efforts to phonate, the patient contracts the muscles of the pharynx, elevating his larynx and approximating the ventricular bands so that sound is produced by their vibration—a pharyngeal instead of a laryngeal voice. Hence, the ventricular bands become irritated and hypertrophic. To correct this the patient is encouraged to repeat over and over those sounds and words which approximate his normal voice; he is required to flex his head toward his chest and the larynx is held down by the thumb and index finger; drills are given in sounding certain vowels (o, e, a, u, i) and consonants (k), using only the first part of the expiration; the larynx is massaged. Most nervous aphonics have no trouble with the muscles of the cheeks, lips and tongue, but when these are paretic they may complicate the aphonia, and systematic exercises are given to overcome such deficiencies. In summarizing, the fundamental necessity of correcting the manner of breathing is reemphasized. The authors have found nearly all cases amenable to treatment, and the earlier it is instituted the better. A. Miller.

V.—MISCELLANEOUS.

Warfare Injuries and Neurosis.

MILLIGAN, SIR W.

Proc. Roy. Soc. Med., Lond., 1915—Laryngol. Sec., VIII—109.

In injuries of the nose and nasopharynx the immediate anxiety has often been the arrest of hemorrhage and the remote how best to restore function and appearance. For hemorrhage about all that can be done is to plug up from the front.

In comminuted injuries of the framework of the nose the maintenance of a free passage and the prevention of adhesions has presented difficulties. As an effective splint, the finger of a rubber glove packed with gauze may be used.

Injuries of the larynx are rare. In one case perichondritis

occurred requiring tracheotomy. Warfare neurosis is very common.

The writer reports case of left recurrent paralysis from bullet wound of face, the bullet being imbedded in the body of the second vertebra. The fibers of the vagus which go to form the recurrent were doubtless injured.

Another case, bullet entering just below and behind the lobule of the ear, traversed the skull and right eye. The cribriform area was so badly damaged that complete anosmia resulted.

Nine or ten cases of deafmutism from shell shock all recovered in six weeks. Abrogation of function was due to temporary suspension of neuron impulses from the higher cortical centers to the periphery.

Many of the ear neuroses occurred in those previously affected with ear disease, which might make one believe that they are due to peripheral rather than central disturbances.

War Wounds in the Domain of Otorhinolaryngology.

GUYOT.

Cor. Bl. f. schweiz. aerzte., Basel—1916—1179.

These observations were made in the military hospital at Lyon.

Wounds of the Nose.—These may be of great variety, from the abrasions at the end of the nose to the complete destruction of the bony skeleton of the nose. The injury varies, almost never resulting in severe infectious manifestations. The wound heals after proper care with drainage. The only result is a larger or smaller deformity, which is fixed by grafts. Projectiles are sometimes very difficult to extract, particularly small pieces of shell in the bone.

Wounds of the Sinus.—These are common, but those of the frontal being often fatal. Sometimes a projectile enters through one of the cheeks, through the sinus maxillaris, nasal fossæ, and out of the maxillary and cheek on the other side. The presence of the maxillary wound does not necessarily signify a maxillary sinusitis, though it is rare that the sinus that is

traversed does not suppurate. Localization is easy. The projectile in the sinus should be removed according to the Caldwell-Luc method in all cases of sinusitis with projectiles, which are not cured with lavages, at the end of a month or two.

Wounds of the Larynx.—These are not very frequent, for most of them are fatal. The author observed one in which the trachea was opened by a bullet. Treatment consisted of drainage with paraffinated gauze, cauterization of the granulations in order to prevent stenosis of the trachea, and later dilatation.

Wounds of the Auditory Apparatus and War Deafness.—These are most interesting lesions, particularly those of war deafness. They may be divided into two classes, deafness by direct or indirect traumatism.

1. Deafness by direct traumatism may be produced by penetration of the projectile or by shock upon the petrous bone. When the wound is cured we must look after the auditory function in order to save what we can. It is necessary to operate when mastoiditis, which is always suppurative, is present. The bony fragments, and if there is a projectile, must be removed, or if a patient presents one of the complications, severe paralysis, labyrinth injury and signs of meningitis, the operation is imperative. In case of a fracture of the bone, the patient should be put to bed and kept quiet as long as possible, if there is no symptom requiring operation. When there is no fracture of the petrous bone, we have to do with the labyrinth concussion, whose symptoms are classical.

2. Deafness by Indirect Traumatism.—This is the true deafness of war. The violent displacement from the explosion of gas, the so-called "wind of the shell," is what causes loss of audition. The drum is violently injured by the gas produced by the explosion of a shell near by. It is torn by the column of compressed air. Two mechanisms result, either the tympanum is ruptured by the shock or it resists. If the tympanum is ruptured, there will be hemorrhages and supuration of the tympanic cavity, especially if the ambulance physician has used lavage. If the tympanum resists, then all the air pressure is transmitted to the internal ear and produces a labyrinth concussion; most often the soldier loses con-

sciousness, and when he revives is dizzy, shaking, vomits and has violent tinnitus. At the same time he is completely deaf on one side and most often on both sides. He has true symptoms of Ménière's disease, traumatic and acute. In most cases the vertigo disappears, then the tinnitus, and, at the end of some weeks, the deafness. The prognosis is less grave than was thought at the beginning. Disturbances of equilibrium disappear first, then the tinnitus, then the deafness. The statistics of Prof. Lannois show that five per cent are deaf. The final class is most interesting. It is the deafness of deafmutes from traumatic neurosis. They recover entirely, if the patient is placed in the hands of a specialist. Deafness may be combined with aphonia, blindness and other nervous symptoms.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOTOLOGY.

Meeting of March 8, 1918.

Case Showing Result of Radical Operation Treated by the Carrel-Dakin Method.

BY JOHN R. PAGE, M. D.

This patient has had a double radical operation performed. Dr. Scruton operated upon the left ear two years ago, and the result was so good the patient was anxious to have the other ear operated on. He had a fair amount of hearing, but a considerable discharge from the right ear, and Dr. Scruton advised against operation, as there was a large perforation and good drainage. With this advice Dr. Page coincided. Nevertheless, the man came back repeatedly and insisted upon having a second operation, saying that he would assume all the responsibility in the matter.

He was operated upon on the first of October, 1917, and was discharged cured at the end of six weeks. The dermatization was very rapid, owing to the fact that a cholesteatomatous membrane covered the inner tympanic wall and dipped into its recesses. The usual incision was made and brought down like an interrogation mark. At the end of the operation it was closed throughout, and a tube was put through the meatus into the cavity, gauze being placed loosely around the tube to hold it in place, and the auricle and skin protected with vaselin gauze. Then from three drams to one-half ounce of

Dakin's solution was injected through this tube every two hours for 48 hours. Bacterial counts were ordered but the orders were not satisfactorily carried out, as the facilities for doing it properly were lacking. The cavity, however, looked very clean, so after forty-eight hours it was filled with chloramin paste, which is soluble in water. This was syringed out every day with Dakin's solution and renewed. The tympanum was dermatized in ten days, but the posterior cavity required six weeks for complete dermatization.

The man's hearing was extremely good for about two months, and he was very happy over the results. Then he came back one day saying his hearing was not so good. Examination of the ear showed no reason for any impairment of the hearing, but closer inspection showed a tiny crust on the floor of the hypertympanic space. This was removed with a swab, revealing a little secretion. Immediately he declared that he heard perfectly, and went home satisfied. This happened four or five times. About a week ago he returned, saying that he was very deaf. This examination showed a little granulation on the floor between the promontory and the facial ridge in the hypotympanic space. This was rubbed with nitrate of silver, and he left the office saying that he heard very well, but says now that he has not heard so well since. There is evidently some interference in that locality, but it is difficult to explain.

Dr. Page said that he had treated only three radical with chloramin paste in the cavity, and only one or two cases of simple mastoids, but with the latter it got so mushy that it was evident the cavity was not sufficiently sterile when it was used. Carrel says that if a wound has been thoroughly cleansed and the bacterial count is found to be very low, the chloramin paste will keep it clean for twenty-four hours. Evidently in the simple mastoid cases in which Dr. Page tried this paste the wounds were not clean, for there was a great deal of secretion at the end of the twenty-four hours, so they were washed out with Dakin's solution, using simple gauze drainage.

The theory on which the chloramin paste is used in connection with the Dakin's solution is that after the wound has

been rendered practically free from bacteria by the Dakin's solution the one per cent of chloramin, being in a paste that is soluble in water, comes in contact with the surface of the wound and dissolves away as it is used up, and allows the fresh, undissolved paste to keep in contact with the tissues, thus the action of the chloramin is prolonged and the wounds are kept clean.

A second case was presented to show the action of the Dakin's solution on what had been an unusually dirty mastoid wound. This patient was operated upon three weeks ago tomorrow. The rubber tube was put into the wound at the time of the operation, part of the wound being left open with a piece of gauze. When the Dakin's solution was instilled the patient was directed to lie on the opposite side, with the head low, and when the wound was filled with the fluid it came out at a point which showed the cavity to be completely filled. The wound was filled with the solution every hour for the first twenty-four or forty-eight hours; after this the wound was allowed to close together with a little drainage. The patient was not seen by Dr. Page for two weeks. It was then found to be badly infected, and when the bandage was taken off pus poured out of the lower part of the wound, which was wide open. The house surgeon had been syringing it out every day with Dakin's solution, but apparently without any effect. Dr. Page directed that the patient be put back to bed and the tube reinserted, and the Dakin's solution instilled every hour for three or four days, after which the surgeons reported that it was clean. The dressing and the tube were taken out and a little drain put in the bottom of the wound. Next day this was removed, and the next day the wound was found to have no secretion whatever and to be closed except a small opening where the tube had been. The point where the tube was has not closed entirely, but there is no secretion, and the wound has almost healed.

Dr. Page said that when he found the wound so dirty, he made smears, which were examined in the laboratory and reported that it was loaded with bacteria. A bacterial count was made on the day the tube was removed, and there were no bacteria. The canal has always been dry.

**Case Showing Result of Radical Operation Subsequently
Treated With Dakin Solution.**

BY PHILIP D. KERRISON, M. D.

DISCUSSION.

DR. PAGE said that the ideal method would be to fill the cavity with Dakin's solution for fifteen or twenty minutes every hour or two, as Dr. Kerrison has described, for experiments have shown that after about fifteen minutes' contact with the wound the solution becomes so decomposed by the chemical action on the tissues it is of no more use. With a private patient and a special nurse, that method can be carried out, but under war conditions he thought it would be found that the tube met the conditions more satisfactorily. It was also found advisable to protect the skin with the vaselin, for in some instances he had seen a dermatitis extending down the neck which lasted for several weeks. It might even leave a permanent mark.

Dr. Page said that experiments with the Dakin's solution have shown that it more nearly approaches the ideal antiseptic than anything yet discovered. Carrel says it is the best thing that he has been able to reach so far, in that it does not interfere but very slightly with tissue repair, and practically does not interfere with the formation of healthy granulations, and he makes the statement that infection is the cause of exuberant granulation tissue which is an evidence of the presence of bacteria in a wound.

He would bring the patient back next month, and he was quite certain that she would not have a hollow space. She might have more of a depression than she had then, as the soft parts would probably contract down to the bone, and in the process of repair a network of trabeculae would form between the bone and the tissue and later contract. It would doubtless bridge over and show such a result as is seen in a healing mastoid. In all of these recent wounds one can press on the spot and find a cavity for a considerable period of time. The point brought up by Dr. Richards was an interesting one, but his idea that tissue repair is arrested is just what Dr. Carrel claims that Dakin's solution does not do.

DR. BLACKWELL asked whether lumbar puncture had been made ten years ago when the patient had meningitis.

DR. KERRISON said that the question had been brought up at the time, and lumbar puncture was decided against as not essential to a diagnosis. The patient was unconscious or delirious, had rigidity of the neck and contracted pupils, and the diagnosis seemed clear. The views on lumbar puncture were different ten years ago from now. The exposure of the dura was just what one would make in exploring for a supposed abscess. Three vertical incisions an inch apart were made over the cortex, and a grooved director inserted through the posterior incision and carried into the lateral ventricle.

DR. BLACKWELL said that that was the point he wished to bring out.

DR. KERRISON said that there was a difference in the use of the Dakin's fluid in a wound resulting from a simple mastoidectomy and in the wounds usually treated by the Carrel method. Most of the war wounds are deep wounds in the muscles or soft tissues, and when Carrel said that the Dakin fluid does not interfere with repair he meant the repair of normal muscle tissue; but in a mastoid wound granulations must form to fill up the surgical cavity resulting from the operation; and it is a question whether the Dakin's fluid will not inhibit this necessary process of repair.

Labyrinthitis Complicated by Meningitis of Doubtful Origin.

BY T. LAURENCE SAUNDERS, M. D.

The author is indebted to Dr. Cornelius G. Coakley for permission to report this case.

The patient, Fred M., a schoolboy, was admitted to one of the medical wards at Bellevue Hospital on June 8, 1917, complaining of headache and pain down the back of his neck. His past history was not of interest excepting that he was supposed to have had an abscess in the left ear when a baby.

Three weeks before admission, after a trip to Coney Island and a ride on a jolting machine, he felt very dizzy. This dizziness continued during the rest of the day and evening and was accompanied by nausea and vomiting. The patient complained of a severe pain in the left ear and felt feverish. Two

days later the ear started to discharge, and the pain in the ear and the discharge continued up to the time of admission. The pain was of sufficient severity to keep him awake at night.

Physical examination on admission to the hospital showed him to be a frail looking boy of fourteen years, with face flushed and complaining of headache. The pupils reacted to light, but the reaction was not well sustained. There was no ocular palsy. The left ear showed a profuse foul discharge welling through a perforation in the drum; sagging of the posterior canal wall; slight tenderness over the mastoid tip. Right ear, negative. Apparently tenderness along jugular vein; lymph nodes on left side of neck slightly enlarged and tender. The remainder of the examination was unimportant, save that there was a slight Koenig's on the left side. Temperature, 101; pulse, 72; respirations, 16.

White blood count, 22,000; polynuclears, 90 per cent. Blood cultures sterile on June 10th.

He was transferred to the otologic and laryngologic division. Otologic examination at that time disclosed a chronic suppurating ear on the left side with a dead labyrinth.

Second Operation, June 21.—Spinal tap; cloudy fluid; slight pressure; cell count, 410. Globulin test does not reduce Fehling's.

On June 14th a radical operation was performed by the author, and a cholesteatomatous mass was found in the middle ear and antrum. There was a fistula in the external semicircular canal. The external semicircular canal was uncapped and the vestibule opened posteriorly through the hard angle. Cholesteatoma was found in the vestibule. The bridge of bone was removed beneath the oval and round windows, and also the promontory was uncapped. At this point the patient's general condition made it necessary to stop the operation before the cerebral and cerebellar dura was exposed. After the operation the patient's condition seemed to improve, the headache and pain in the back lessening. However, this was but temporary, and on June 20th he had a slight chill with rise in temperature and increase of headache. The headache and tenderness in the muscles of the neck became more marked. On June 22d the second operation was performed; the original

wound was reopened, and a large area of bone removed over the cerebral and cerebellar areas; dura congested, no abscess found. A spinal tap taken at the first operation showed a cloudy fluid under pressure, 410 cells per cubic millimeter; globulin present; Fehling's not reduced.

The second operation effected an improvement which, however, was but temporary. On June 24th the pain in the head and neck were severe, the reflexes were exaggerated; ankle clonus was present, and the patient vomited twice without nausea.

On June 28th spinal puncture was again performed; fifteen cubic centimeters of spinal fluid were drawn, and eight cubic centimeters of automeningococcus injected. From that time on the patient made a steady recovery. The wound healed finally, and the patient now has a dry though deaf ear.

The case is presented for the purpose of emphasizing the question of treatment. Is it not better in certain borderline cases of meningitis to resort to the removal of large areas of bone around the original focus, together with frequent spinal taps and the possible use of automeningococcus serum, rather than to incise the dura at the time of operation?

DR. ALFRED BRAUN did not think that Dr. Saunders was justified in making a diagnosis of meningitis in his case, as there were no bacteria found in the spinal fluid. He had a case of abscess in the temporosphenoidal lobe of the brain, in which the spinal fluid was so turbid that after standing for an hour in a test tube the sediment filled almost half the tube. The fluid was sterile, and the patient recovered promptly after drainage of the abscess. The cause of the meningeal symptoms in Dr. Saunders' case was doubtful. Dr. Braun did not see how a real meningitis could be cured by simply exposing the dura.

The type of labyrinth operation which should be performed depends upon the condition which is present. In this case there was a dead labyrinth, with meningeal symptoms, and therefore a labyrinth operation of the type of the Neumann operation should have been done. The vestibule should have been opened by removing the posterior surface of the petrous pyramid, as far as the internal auditory canal, thus exposing

the dura of the posterior fossa, in order to thoroughly investigate this region.

DR. DANZIGER agreed with Dr. Braun that one cannot call a case true meningitis unless the bacteria are found in the spinal fluid, and cited a case of removal of polypi from the middle ear, which was admitted into the hospital three days later with all the symptoms of meningitis. A spinal puncture showed cloudy fluid which was sterile. The patient was in such poor condition that it was not thought advisable to operate, but repeated lumbar puncture was made and he recovered. After that a radical mastoid was performed, and the man disappeared from observation; but returned three months later, having developed a meningitis, and the bacteria *Proteus* was found in the fluid. Very likely the first time he had some toxic condition, and then developed a true meningitis.

DR. KERRISON said he did not see the logic of the discussion. Apparently the question at issue was mainly as to a choice of terms. It would seem from the discussion that some of the speakers regarded the finding of a microorganism in the spinal fluid as essential to a diagnosis. That is not the opinion held by the Board of Health of New York City. Some of their staff have recently published the records in a large series of cases which they classify largely according to cytologic and chemical changes in the spinal fluid. In other words, they do not regard the finding of a microorganism as necessarily essential to a diagnosis of meningitis, though the demonstration of its presence would make the diagnosis more exact and complete.

DR. BRAUN did not think that it was simply a question of difference in name. If you have a real meningitis with bacteria in the spinal fluid, the patient will probably die. In cases where there are meningeal symptoms without bacteria in the cerebrospinal fluid, the patient is very apt to recover.

DR. SAUNDERS said that while he did not agree with Dr. Braun and Dr. Richards that only those cases in which germs are found in the spinal fluid should be called meningitis, it really made little difference in these cases whether they were called serous meningitis, meningismis, or meningitis, the pathologic condition was the same. The case was presented to

raise the question of treatment in certain of these symptoms, and if it would make these gentlemen any happier he would be glad to change the title of his paper to "Labyrinthitis Complicated by Meningeal Symptoms of Doubtful Origin."

Case of Abducens Paralysis Complicating Suppurative Meningitis.

BY PHILIP D. KERRISON, M. D.

DISCUSSION.

DR. BLACKWELL told of a case of abducens paralysis which had been operated upon twice for mastoiditis, he doing the second operation. Subsequently the patient developed an infection of the internal ear and died of meningitis.

Paper: Report of a Case of Granuloma of the Mastoid Simulating Subperiosteal Abscess.*

BY JOHN D. RICHARDS, M. D.

*See page 487.

NEW YORK ACADEMY OF MEDICINE,
SECTION ON OTOTOLOGY.

Meeting of April 12, 1918.

**Chronic Suppuration in Middle and Internal Ear; Radical Mastoid
Operation and Labyrinthectomy.**

BY JOHN MCCOY, M. D.

Frank M., age twenty-one years, was first seen January 16, 1918. He stated that he had had deficient hearing for the past five or six years, and had had several attacks of dizziness during the past year.

On examination, both ears showed pus in the external canals. In the left ear, the drum was destroyed except for a thickened margin, and a few drops of pus were seen in the middle ear cavity. In the right ear the drum was destroyed, and the middle ear contained granulations and foul smelling pus.

The ear tests showed the following: The voice was heard in the left ear at fifteen feet; in the right ear it could not be heard. The Weber was referred to the left ear. There was no spontaneous nystagmus. After turning to the left there was no after-nystagmus; on turning to the right, there was after-nystagmus for twenty-one seconds. The caloric test produced no reaction in the right ear; a good reaction in the left ear. The fistula test produced a slight nystagmus from the right ear; no reaction from the left ear. The pointing test was normal for both the right and the left side. The pointing reaction after rotation was normal for both sides.

Diagnosis: Chronic suppuration in the right middle ear and mastoid; also chronic diffuse suppurative labyrinthitis.

On January 24th a radical mastoid operation was performed in the right ear, throwing the mastoid and middle ear cavities into one. It was then seen that a large fistulous opening eroded almost the entire outer wall of the external semicircular canal and that this opening contained granulations and foul smelling pus. Accordingly, it was decided to exenterate the internal ear. The vestibule was entered by chiseling down through the solid angle, and the various canals were then exposed. The vestibule contained granulations. After this, the promontory was taken down from the oval window to its anterior border. No actual pus, but a turbid serum, was found here, so it was decided not to further remove the cochlear whorls. The wound was packed and the radical cavity dressed in the usual manner, except that a slight opening was left in the mastoid incision for more adequate drainage. This was allowed to heal subsequently by granulation.

The patient (shown tonight) made an uninterrupted and uneventful convalescence. His physical condition has greatly improved since the operation. He has put on twenty pounds in weight.

DISCUSSION.

DR. BRAUN said he had been much interested in one point in the history read by Dr. McCoy—i. e., that he found a positive fistula reaction with a dead labyrinth. Dr. Braun said he did not see how that could occur. A fistula reaction is a physiologic response to stimulation of a functioning labyrinth. He would be interested to know what explanation of the phenomenon Dr. McCoy had to offer.

DR. MCCOY replied that it was not a typical fistula reaction, but after pressure was made for some seconds there was a slight twitching of the eye, and it was thought that some of the nerve endings were not quite dead. It was only a slight flicker, not a typical fistula. When the labyrinth was exposed granulations were found lining the large opening in the external semicircular canal. It was the largest fistula he had ever seen. The whole outer wall was eroded.

Paper: The Pathology of Sinus Thrombosis.*

BY ALFRED BRAUN, M. D.

DISCUSSION.

DR. BLACKWELL said that the paper was a most timely and interesting one, and had brought up the wide variety of clinical symptoms in sinus thrombosis which can only be accounted for by the extremely varied clinical pictures. Some ten years ago he had himself reported two cases of sinus thrombosis, in one of which, an acute otitis, the clot formed in seventy-two hours and was found to have extended back as far as the torcular and facial vein—in seventy-two hours after the first clinical symptoms. In the other case the thrombosis had existed for a number of months, and at the time of operation the sigmoid sinus was nothing but a sloughing band.

DR. W. W. CARTER called attention to the very interesting experiment mentioned by Dr. Braun—that of causing thrombosis in the vein by the application of infectious material to the outer surface of the vessel. It would seem that under such circumstances there would be a thrombosis in the vein in every case of perisinus abscess, whereas we frequently have perisinus abscesses in which we do not have thrombosis of the vein.

He also offered an explanation as to why the vein is empty below the thrombosis. It is probably due to the fact that there is a slight negative pressure normally in the veins of the neck.

DR. BLACKWELL asked if he was correct in understanding Dr. Braun to say that the introduction of a sterile instrument into the veins did not lead to the formation of a clot. Of course, if that were the case, it would argue in favor of puncturing the vein with a needle at the time of operation, in order to determine in certain cases whether there really was a clot. He himself had always thought that that was a good way to start a clot, but did not know whether that had been demonstrated.

DR. BRAUN, replying to Dr. Blackwell, said that the results of experiment showed that when a vein was punctured by a

*See page 461.

sterile instrument, and the operation was done under aseptic precautions, a minimal clot was produced—a few blood platelets were found at the edge of the wound; after a while there was organization, and nothing further occurred—no infected thrombus was formed, nothing pathologic. If bacteria are injected into the circulation, and a vein in some other part of the body ligated or injured, a thrombus is formed at the point of ligation. Bacteria injected into the circulation where the vessels are normal do not cause a thrombosis; the circulation disposes of the bacteria. The explanation of the fact that we sometimes get thrombosis as the result of accidental injury to the sinus at operation is probably owing to the fact that bacteria enter the sinus at the site of operation, in addition to the fact that the sinus is collapsed by the packing used to control the bleeding. If we could disregard the bleeding and not compress the sinus, the probabilities are that we would rarely have a thrombosis resulting from injury to the sinus.

Replying to Dr. Carter's inquiry as to why a thrombus does not always occur when there is infected material about the sinus, Dr. Braun said that experiments showed that thrombi result sometimes when infected material is placed over a sinus, but not always; they are more apt to occur after long contact of bacteria with the sinus wall. The sinus wall itself is one of the best means of protection for the interior of the sinus. It becomes very much thickened when there is a perisinus abscess over it, and is covered with granulation tissue, being sometimes ten to twelve times its natural thickness, and so offers resistance to the passage of bacteria through the walls. Common experience shows that sinus thrombosis is present most often when the outer sinus wall appears almost normal. When the sinus wall is covered by thick granulations the interior of the sinus is usually normal.

As for the explanation of the collapse of the internal jugular vein, if Dr. Carter's proposition held good, there would be a collapsed vein in every case in which the clot extended below the entrance of the facial into the internal jugular vein. This is not the case. In many cases the internal jugular vein is full of blood. The most probable explanation is that an inflammation occurs around the veins—a perijugulitis—and this results in collapse and obliteration of the vein.

**Paper: Otogenous Brain Abscess, With Hemiplegia and Aphasia;
Radical Mastoid Operation; Cerebral Drainage;
Decompression.***

BY OTTO GLOGAU, M. D.

DISCUSSION.

DR. HERZIG asked whether a spinal cell count was made, and whether the condition was a neuritis or a choked disc.

DR. GLOGAU replied that a cell count was made showing a decreased number of cells (polynuclear). The condition was an optic neuritis, not a choked disc.

DR. MACKENTY said that Dr. Glogau was to be congratulated not only on the results obtained but on the excellent report presented. It is not often that one hears a case so concretely and well stated. It was as clear as a piece of glass, and one seldom has the pleasure of listening to such a report.

DR. GLOGAU also considered hernia of the brain to be a consequence of the diseased condition of the adjacent brain tissues. He had not amputated the protruding masses of brain tissue, as they sloughed away. However, he prevented a prolapse of the healthy portions by means of pressure, application of semisolid paraffin nets underneath, which, by means of the application of scarlet red ointment, the protective dermatization of the exposed brain portion took place rapidly. The cerebrospinal fluid showed decreased lymph count and albumen.

*See page 456.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of February 19, 1918.

THE PRESIDENT, DR. FRANK ALLPORT, IN THE CHAIR.

Paper: Indications for Variations in Technic in Tonsillectomy.*

BY CHARLES L. ADAMS, M. D.

DISCUSSION.

DR. OTTO J. STEIN congratulated the author and thought he had grasped the subject exceedingly well. He thought his classification of tonsils was accepted by all. There was one addition to the classification which the essayist had failed to recognize, but which he thought men who were doing this type of work should include. The specialist frequently saw the ill result of operations performed by fairly good operators and particularly those performed by men who were not especially well acquainted with the throat, and the result was sometimes very poor. He referred to the type of case which had been operated upon and pieces of tonsil or small masses of lymphoid tissue had become buried in the scar tissue. Specialists saw such cases frequently, and in some instances the tonsil had been taken out with the capsule remaining intact and this tissue afterward took on hypertrophic growth and the patient had to be reoperated. It was sometimes difficult to tell what the patient had had done. In these cases the question of the instrument to use was very important. Most of them had to be resected. He had seen several such cases, one of them being a case which was seen by Dr. Sluder when he was first demonstrating his instrument at the county hospital. One of the cases had been operated upon, and it was impossi-

*See page 474.

ble to use the instrument, for there was practically no tonsil tissue to be seen. They all tried to use the Sluder instrument, and besides attempts were made to dissect out the tissue, but it was found that the newly formed tissue around the aponeurosis contained small pus pockets, and it was only by painstaking work that it was dissected out. These cases come up frequently in private practice and in the clinic, and there was a question as to whether there was really any tonsil tissue present or not.

He cited the case of a patient seen that day in which the patient said she had had her adenoids taken out and was not sure whether the tonsils were taken out or not. She had a lot of trouble and he felt that there undoubtedly was lymphoid tissue buried in the scar tissue which had to be dissected out. He believed this type of case should be taken into consideration.

DR. JOSEPH C. BECK said there had been so much tonsil discussion last year that he supposed everyone was satiated with the subject. He thanked Dr. Adams for the compliment he had paid the Beck tonsillectome in his paper. He thought there was another type of tonsil which had not been mentioned—namely, the tonsil which had had a great many peritonsillar infections with abscesses that had been opened and drained. Those cases presented special difficulties in removal. In many of these cases and cases of the type mentioned by Dr. Stein he had been surprised to find that he could deliver them into a very small ring of the snare, although he had thought they would have to be dissected. He believed the careful dissection under local anesthesia still held first place for adults; he still liked to dissect the small flat tonsils from their attachment. He was interested in the opening words quoted from Dr. Fletcher, and also in the remarks frequently heard from Dr. Kenyon on preservation of the tonsil tissue, and particularly the capsule. Dr. Beck had frequently spoken of the intracapsular operation—meaning by that leaving the capsule intact, in place, and obtaining a perfect tonsillectomy, and he was prepared to demonstrate that operation to anyone who would take the trouble to see it. It meant the delivery of the tonsil with the ring instrument up to the time of twisting it off, and while the cauliflower mass of lymphoid tissue

was protruding, the capsule turned upon itself. The lymphoid tissue was removed with an instrument as employed to express for traucoma bodies. In this way there was nothing left but the trabeculae and capsule. He was sure everyone operating on tonsils had been surprised upon removing a small tonsil to find a large cavity. This was not surprising to him, knowing that the constrictor muscles of the pharynx were intimately adherent through the aponeurosis to the capsule, and when the capsule was removed, like the raphe of any muscle, the tissues would spread. It lost the attachment, and the action of the muscle was in the opposite direction. He believed in the cases of vocalists where the voice was of high potential value one might develop the technic of intracapsular tonsillectomy, but he was not yet ready to make any final statement and certainly not willing to substitute the regular tonsillectomy with capsule intact, especially in cases of chronic tonsillar disease with systemic conditions probably due to it.

DR. ELMER L. KENYON stated that he was taking care of a young woman of twenty-two who had just begun vocal training. Her tonsils had been removed quite a number of years before. On the left side the anterior pillar was firmly adherent to the posterior pillar for most of its extent; the posterior pillar on the left was intact. On the right side the anterior pillar was intact as far as he could tell; the posterior pillar with its palatopharyngeus muscle was practically destroyed. There was no injury to the speaking voice, but the palate was deformed and operated in an oblique manner. He did not know how much this would interfere with the development of her voice, and no one knew at this stage of the development of the subject, but as scientific men they all know that the muscles of the throat should not be injured if it could be avoided.

As to the throats of children, after operation for tonsillectomy, one saw throats like this one or resembling this, in the great majority of cases. Fortunately, the palate was not the primary seat of the voice. If the larynx instead of the palate were involved in the operation, such operative results would be unthinkable. Dr. Makuen was absolutely correct, however, in insisting that the voice had a right to be heard in tonsillectomy, although because of anatomic considerations

he could not sanction Dr. Makuen's operation. When adenoids were removed one did not remove any extensive capsular structure, because there was no complicated muscular structure beneath requiring support. The function of the capsule of the faucial tonsil was to support the faucial muscles. In doing a tonsillectomy, in the great majority of cases the anterior pillar must be destroyed; this was unavoidable. Fortunately, that appeared not to be a very serious matter from the standpoint of the speaking voice. The palatal muscle was usually a small muscle, and its function was to regulate the more delicate action of the soft palate, especially in singing. Dr. Makuen had said the palatal muscle was a highly developed muscle in singers, but Dr. Kenyon could not confirm that statement from personal observation. There was nothing on record in the way of proof to show that an intracapsular operation might not be developed which would be of equal value, from the standpoint of removal of infection, to the extracapsular operation. For years operators had done more or less crude tonsillectomies, but never during that period had conceived of the idea of taking out all of the lymphatic tissue. The capsule was not the diseased part; he had examined fifty or more cases very carefully and had found no evidence of capsular infection. The surgeon had jumped from a crude tonsillotomy to a complete tonsillectomy, without first finding out whether a thorough operation done intracapsularly would not serve fully as well as the more radical and dangerous tonsillectomy. So until it had been shown that a thorough intracapsular operation was incapable of doing practically as well as the extracapsular operation, tonsillectomy was on a shaky foundation. He had carefully dissected out the lymphatic tissue within the capsule in a few cases, an operation he called "intracapsular lymphoidectomy." The result of this, after watching the patients for a long period, was that the deformity was very slight and there was no suggestion of lymphoid tissue so far as he had observed.

DR. STEIN had felt it necessary to call attention to the necessity for taking into special consideration tonsillectomized throats because of the diseased lymphatic tissue remaining in many cases after operation. They all know this to be true

—they too had dissected out lymphatic tissue in such cases. Then why be so troubled by an intracapsular operation which might possibly leave a little lymphatic tissue? He thought we should not be too dogmatic in the conclusion that the extracapsular operation was the necessary operation for all tonsils.

Another "special indication for variation of technic" in tonsillectomy was in the cases of vocalists; of course one naturally should give the most careful consideration to the tonsils in the vocalist, from the standpoint of possible deformity. And he wished to bring forward this important and yet difficult consideration: namely, all palates were not of equal length. Some short palates which do not appear deformed are incapable of reaching the posterior wall, and the voice consequently is permanently nasal. Other soft palates are relatively short but adequate. If it was discovered through observation that the palate appeared to be relatively short, one should beware of doing tonsillectomy in that case, because a tonsillectomy almost regularly diminished the backward reach of the palate. He did not know how many cases of permanently nasalized speaking voice he had seen following tonsillectomy—not a large number, considering the whole number of tonsillectomies done—but he had not seen nearly all there were; and as the operation was being carried on now, operators were systematically making nasal speaking voices, and he believed it was a matter which ought to be considered.

DR. J. HOLINGER said there were two points which had occurred to him: one was that it must not be forgotten that the tonsil is a secondary organ, a lymphatic organ, carrying lymph from the nasopharynx, and that trouble up there—no matter how carefully and completely the tonsil was removed—was likely to cause difficulty again with lymphatic tissue of one kind or another. Gerdes long ago showed that the hypertrophic lateral strands in the pharynx were new formed tonsil tissue with all the characteristics that belong to it. In the treatment after removal of tonsils those parts of the pharynx should not be neglected. Suppurating processes in the nose and nasopharynx should not be overlooked, and in this way the work of the specialist might be made superior to that of the general practitioner in cutting out tonsils.

The second point was this: The scar does not always correspond to the amount of injury. In two patients with identically the same incision one might have an almost invisible scar, and in the other there would be a clumsy, thick scar almost like a keloid. In such scars little masses of lymphoid tissue which in one would simply be absorbed, may produce in another person a great deal of irritation. The operation and the operator cannot be blamed for all the bad results.

DR. CHARLES G. ADAMS, in closing, thanked the society for the honor shown him in admitting him to membership and for the discussion given the paper. He thought if there was no discussion at all a paper fell flat, and if the discussion tore the paper to pieces the author felt badly, so he thought he had fared very well.

DR. CHARLES M. ROBERTSON discussed some investigations which he is carrying on in connection with aviation tests, and illustrated his talk with charts.

MID-WESTERN SECTION, AMERICAN LARYNGO-
LOGICAL, RHINOLOGICAL AND OTOLOGICAL
SOCIETY.

MEETING AT BOULDER, COLO., FEBRUARY 23, 1918.

**Abscess of the Left Frontal Lobe Following Suppuration of the
Frontal Sinus; Report of a Case and Exhibition of Specimen.***

W. V. MULLIN, M. D.

DISCUSSION.

DR. F. E. WALLACE said that in all cases of colds and nasal infections we should insist on having early treatment. Early treatments may possibly mean abortive treatment. The public should be made conversant with the dire results of neglect. If, as is true, we have an infected sinus as the origin of the brain abscess, then it is very necessary to begin treatment early, and that an early operation be done to give free drainage, so that pressure may not cause necrosis.

We all know that infection can spread by direct communication, but also, in many cases, it no doubt spreads by way of the vessels. Then, too, an infected embolus or a thrombus can be given as a cause, as is also true of cholesteatoma. By direct extension from caries or necrotic degeneration, the dura becomes inflamed; throws out plastic material; becomes attached to the bone; and thus abscesses form. If we are dealing with an infection from the influenza bacillus there is more reason for haste in early treatment and early operation, because of the intensive destruction of bone tissue.

The signs and symptoms are not always very well marked. Headaches and temperature may be very slight or entirely missing. The headaches are generally referred to the affected side. Chronic inflammation, thickening or adhesions of the meninges covering the cribriform plate is a probable cause for the persistent and incurable headaches. All the frontal

*See page 667.

lobe, in front of the coronal suture, presides only over the intellectual functions, so the only symptoms we may have might be some dullness of intellect. Reports of cases would seem to indicate that an abscess can be present in the frontal lobe indefinitely without presenting any symptoms. So also can the destruction of the brain tissue be enormous without creating cerebral symptoms. The lack of symptoms, or indefinite symptoms, may therefore be exceedingly confusing.

Sharpe thinks that the symptoms we do get are chiefly from pressure, rather than from the necrosis or destruction of tissue. That this pressure creates an edema of the surrounding tissue, causing dural tension, and at this pressure an edema is greater at times, and we thus get the characteristic periodicity of the headaches, nausea, vomiting, etc. He thinks also that the intracranial pressure during these attacks is generally registered in the fundus of the eye, viz., edema and haziness of the disc and dilation of the veins.

DR. W. F. CALLFAS of Omaha: I would like to mention the fact that I have seen several cases of brain abscess in the last few years. One that I have in mind just now is one that Dr. Gifford had a year ago which terminated fatally. The X-ray does not always show the presence of an abscess in the brain; at least, it did not in some of these cases. Another thing, if you insert your needle, if the pus is thick you are not going to get the pus, at least that has been the experience in our cases. Dr. Gifford devised an instrument which he inserts, and as he penetrates he separates the blades and makes a wide separation. If there is any pus at all you can see right in, no matter how thick it is—you can see the pus and it will come out. Most of the cases that I have seen have been Dr. Gifford's cases and most of them recovered.

DR. C. A. RINGLE: Was that a staphylococcus aureus infection? Dr. Mullin replied that it was reported as such by the bacteriologist.

My experience has been, and I have read in different authorities, that the staphylococcus aureus has a special tendency to attack the bone, and my experience in treating yellow staphylococcus infections of the middle ear and the mastoid, and wherever else I find them, is that they have been very persistent in their tendencies.

DR. ROBERT LEVY: I would like to ask Dr. Mullin if the two sinuses had a septum between them. Dr. Mullin replied that there was a septum and that it was in the median line.

Dr. Levy asked if it was complete, to which Dr. Mullin replied it was.

That is rather an interesting feature because of the conclusion that Dr. Mullin has arrived at as to the amount of trouble on the opposite side, the one showing the greater symptoms. Another interesting feature is the nature of the infection, giving rise to such extensive and rapid involvement. The abscess was evidently an acute one, judging from the symptoms, for we know that cerebral abscess manifests itself in three stages, the first, the second or latent stage, and the final stage. It is usual for no symptoms to manifest themselves during the latent stage, and this is particularly true when involving the frontal lobe. If the diagnosis can be made the case is entirely an operable one. The patient's symptoms having been alleviated, he did not present himself for observation, which, of course, added materially to the difficulties Dr. Mullin had to contend with.

DR. H. L. BAUM: I would like to ask Dr. Mullin if the bacteriologic diagnosis here presented was made from a smear or culture. Dr. Mullin replied both.

The point Dr. Levy mentioned, that it is not usual to find such extensive destruction from the staphylococcus, is, of course, true. The probability is that the staphylococcus was secondary. The abscess was evidently not an acute condition, because if it were the patient would have had more symptoms than he manifested. A slower formation, possibly extending over a period that was not thought of at the time the case was being treated, would permit the secondary infection which nearly always takes place in chronic abscess formations when in communication externally, and such infection is usually staphylococcus. I know of a few cases of brain abscess, of middle lobe and cerebellum, that I have had occasion to post, and all have either been sterile or staphylococcus, although probably originally streptococcus.

DR. D. A. STRICKLER: Another point raised by these gentlemen in their discussion is the inability to discover by the X-ray the abscess of the brain. I am not prepared to report fully the

case seen within the last year, but it was one in which I had quite a good deal of interest. I was called out to see a gentleman one morning who had a great deal of pain on the left side of his head, and I found that he had a chronic ear condition. My tentative diagnosis was cerebral abscess; he had a pressure pulse, and there were very few symptoms outside of this and the pain. I had Dr. Moleen see the case, and he said there were no symptoms of brain lesion that he could determine. The man improved quite rapidly after free incision of the drumhead. I don't know that we got any particular discharge or had any particular reason for expecting rapid improvement. I did it only as a precautionary measure. He was allowed to go home, and after a couple of days his pain began very severely again. He was again sent to the hospital, and Dr. Moleen again went over the case with negative findings, and I had an X-ray made and the findings in that were negative. I did not feel that we were justified in doing any surgical work, although I had a surgeon ready for the work and the ear cleaned up. The man developed epileptiform attacks. In fact, I learned he had epileptiform attacks before. Subsequently, he went into the country hospital, became insane and died. An autopsy showed the abscess and the usual position of temporosphenoidal. I was interested particularly to know what has been the experience of members of this society on the reliability of the X-ray examinations of similar cases and to what extent we would be justified in going in on a clinical diagnosis of cerebral abscess without X-ray findings or localizing symptoms.

DR. W. V. MULLIN: I think Dr. Wallace's point about instructing the patient concerning the necessity of taking treatment in sinus cases and of some of the complications that may follow suppuration of the sinus is a very good one. Dr. Wallace said he had never had a case of brain abscess, and this is the first abscess following frontal sinus disease that I have had in my practice. I saw one case in consultation and saw the postmortem of an abscess following an erosion in the sphenoid sinus; but one does not think of it as being a probable complication in low grade infections like this one was. I have had very severe infections of the frontal sinus, one in particular in a woman with the most enormous frontal

sinus I have ever seen. I worried daily about her developing either a meningitis or a brain abscess because of the very severe pain and because of it being a pneumococcic infection. But this young chap, as I remarked in my paper, was indifferent about coming back. Perhaps I was indifferent in not insisting upon it, and so I think Dr. Wallace's point is a very good one, and one that has been brought home to me by this case.

In reply to Dr. Baum, I would say that the cultures were obtained very soon after the patient died, as the postmortem was done very soon after death, and the bacteriologist reported a pure and uncontaminated culture of the staphylococcus aureus.

In reply to Dr. Ringle, I think he is right in his statement that the staphylococcus aureus has a selective affinity for bone and causes great softening and destruction and is quite often the offending organism in osteomyelitis.

DR. CALFAS spoke of the X-ray not being of much value in these cases and referred to the value of Dr. Gifford's brain explorer. I have seen the instrument but have never used it. Having a complete cessation of the pus from both sinuses and having seen them discharging freely before, with an increase of the headache over what he had previously had, I think a good stereoscopic picture might have shown a softened area in the bone and prompted external surgical interference. This would have revealed the fistula leading into the brain cavity, as in Krause's case, and exploration made for the abscess and drainage obtained before the pus ruptured into the ventricles might have saved his life.

Experimental Work Upon Accessory Sinuses of Cats.

W. V. MULLIN, M. D.,

COLORADO SPRINGS.

An incision was made over the right brow and a small hole drilled in the anterior wall of the right frontal sinus. A hypodermic needle was introduced, and a few drops of alcohol injected to produce irritation, in the hope of closing the nasofrontal duct. This was followed by violent sneezing, although the cat was well under ether. About one cubic centimeter of

India ink was then injected. There was considerable back-flow of ink around the needle, but no escape from the nose.

After four days the cat was chloroformed and autopsied. The sinus was found well filled with ink, which could be seen to penetrate the posterior bony wall at many points and infiltrate the subjacent dura. No discoloration was detected in the pia nor elsewhere in the cranial cavity. There was seropurulent exudate in the nasal fossa, but no ink.

In several other cats injected in this way there has been slight infiltration of the posterior bony wall of the sinus, but in no other case has it been so pronounced.

In one cat the needle was pushed through the posterior wall and the ink injected into the cranial cavity. At autopsy the entire pia of the brain and medulla was deeply discolored, the pigmentation even extending down into the pia of the cord. Microscopic sections of the cerebrum showed carbon packed in the lymphatics of the pia on the surface of the brain, following the convolutions, and even carried into the depths of the brain in the perivascular lymphatics.

Bone Transplantation for Correction of Nasal Deformities.*

WM. F. CALLFAS, M. D.,

DISCUSSION.

DR. J. N. FOSTER: This paper is a very interesting one, as it shows us the way the new methods have taken the place of the old. We can remember the time when these plastic operations were done largely through transplantation of the skin or the insertion of a plate of metal or other substance. I expect most of us have had the pleasure or duty of removing one of those various plates that have been put in the nose. We have always felt that they necessitated two operations: one, putting them in, and some time later, the second operation of taking them out, as they would nearly always produce irritation. A great many substitutes have been tried and a great many different methods of operation have been undertaken. I think it is largely on account of the failure in some of these cases that we are always seeking something new; but I believe that the bone transplantation is the operation that

*See page 672.

is to be done practically altogether in the future. Especially, where it is done with the periosteum left on the bone, because we know in that way it is better osteotomy. The operation has been very successful, as the doctor states, and these photographs of patients must be very gratifying to him as well as the patient. I have not seen this operation done, nor have I done that kind of work personally, but I removed plates some years ago, that had been put in the nose, and have done plastic operations. However, if I had a patient who needed this work done, I certainly would insist upon it being done as the doctor has described.

DR. W. F. CALLEAS: Since I saw Dr. Jos. C. Beck do his operations several years ago, I have taken up Dr. Wessley Carter's plan of using the rib instead of the tibia. You can readily see that gives the advantage of having more flexibility, and it is an advantage over the other. I want to say in this one case, the most marked case of the two, it doesn't show the whole deformity; you have a side view. In this case there was dipping down between the two nasal processes, an actual dipping down, so that you had to reach down and pull the skin up to bring it to a level with the two supports. You can readily see why he could not get a prominent position. The other case was about as the picture shows. (Referring to photographs.)

Note on Dissection of the Anterior Pillar for Opening Some Peritonsillar Abscesses.

WM. C. BANE, M. C.,

DENVER.

In a large percentage of the cases of peritonsillar abscess the pus is deposited in the anterior superior position. In not a few of these cases the collection of pus is well anterior, producing bulging close to the upper attachment of the plica. It is in just such a case that the operator can reach the pocket of pus by separating the anterior pillar from its attachment to the tonsil, and obtain entrance into the abscess for drainage. It is desirable to endeavor to anesthetize the tissues by the application of a ten per cent solution of cocain and then the

injection of a few drops of a one-fourth per cent solution of cocain where the dissection is to be made.

It is more difficult to anesthetize the inflamed tissue than the normal tissue, as absorption is slower in the former. Having gained entrance into the pus, the opening can readily be enlarged by insertion of a hemostat or probe pointed scissors and spreading the blades. In rare instances the operator can complete the dissection and snare off the tonsil, as I did in one case about a year ago. In this case the tonsil was small, a part having been removed at some previous time, and in opening the abscess so much of the gland was severed that I did a little more dissecting and applied the snare. The soreness was seemingly prolonged by the leaving of the greater area exposed than would otherwise have occurred. However, it was a complete cure for that patient.

DISCUSSION.

DR. C. A. RINGLE: The route which Dr. Bane follows in opening these abscesses is manifestly a very natural and a very inviting one. In a number of cases I have found the pus pocket by taking this route. Now, I have found, of course, as Dr. Bane has, that there is great difficulty in anesthetizing these parts. Any manipulation of the tonsil is always painful and very difficult to alleviate. The way in which I palliate the pain is by explaining to my patient that the inflamed tissues are not very sensitive, especially to a small needle knife. If you press upon the tonsil with the finger it is painful, but there is very little resistance to a fine, sharp knife and it is not so painful. That is the way I get around the anesthesia. I am not successful in using cocain. Of course, after the tonsil has been sufficiently manipulated and handled, as it is necessary to relieve an abscess by Dr. Bane's procedure, I presume it is only another and insignificant step to remove the tonsil, although there is some question as to the advisability of removing an inflamed tonsil.

DR. D. A. STRICKLER: The method of anesthetizing I use, and I think successfully, is to take equal parts of cocain, carbolic acid and menthol. They make a very thick syrupy solution. This is applied over the point of incision. I am sure it will relieve the pain to a large extent.

DR. W. F. CALLFAS: I am sure the doctor's method is a very good one. Just as the doctor expressed himself here. I think if there are symptoms to be observed, we ought to get rid of the pus. I was trying to think of a doctor in Iowa who was at a meeting in Sioux City. He has an especially devised instrument whereby he separates the pillars from the tonsil, and he claims that in more than ninety per cent of the cases it is absolutely unnecessary to remove the tonsil. He separates the pillars from the tonsil and he says he gets good drainage. My practice has been, whenever I have found diseased tonsils with enlarged cervical glands, to remove them.

I would like to suggest a local anesthetic: If you make that equal parts of cocain, phenol, menthol crystals, and camphor gum, you would have four instead of three. The camphor will neutralize the bad effect of the carbolic, and I think the anesthetic works really better that way than it does without it.

DR. J. N. FOSTER: When Drs. Bane and Ringle can use this hypnotic effect upon peritonsillar cases, I am very much interested. So far as my experience goes, I have to open it just as quickly as I can and make as free an opening as I can, and that is about all they are going to stand. I have not been in the habit of putting patients to sleep for doing this work. I have tried cocain and you can use it exactly in the same way as you use it in noninflammatory cases and with no effect at all. It is so inflamed that you cannot anesthetize. I have found in almost all cases the point of incision is a little bit down from the apex under the anterior fold; about one-third of the way down. I use a good strong lance knife, with double edge, and make a good free opening. It can be done quickly.

That brings up the point, too, I think you have all noticed, as to when to open a peritonsillar abscess. I find that as a rule my patients are pretty well out of patience with me when I get ready to open it, because they want it done immediately. We know, in all probability, that the infection has gone through a crypt and it is difficult to reach when it is small. I find that if an attempt is made to open it early we are very frequently unsuccessful in getting free discharge of pus. I have never attempted to take out an acutely inflamed tonsil, but I am curious to know from Dr. Bane if there was any

unusual amount of trouble or bleeding at the time this tonsil was snared out. Dr. Bane made apologies for the few notes, but his paper was very interesting and important to this society.

DR. F. E. WALLACE: Dr. Foster just asked Dr. Bane a question I had expected to ask him as to his opinion regarding the taking out of a tonsil in an acutely inflamed condition. I recall a case I recently operated upon in which I had attempted, under local anesthesia, to open into the abscess, and in which the patient, in spite of the injection of cocain, would not stand for it. So, after having suffered with pain for a day or two longer, he finally consented to a general anesthetic. Both tonsils were actually inflamed, and one had a peritonsillar abscess. I went into the abscess and evacuated about a tablespoonful of very foul pus. I then proceeded to take out both tonsils. I had an extreme amount of bleeding, but recovery was uneventful, and the patient apparently recovered as quickly as in any ordinary tonsil case.

I have made it a habit to paint the raw surface with five per cent solution of iodine after a tonsil operation, with the thought in mind of preventing any infection by sterilizing the surface.

DR. ROBERT LEVY: This is an extremely interesting topic. The point made by the last speaker as to the advantage of this particular operation is a pertinent one, and I take it that Dr. Bane feels that by removing a portion of the tonsil he not only opens well into the abscess cavity, establishing free drainage, but also prevents recurrence of the peritonsillar abscess. As a matter of fact, I think the first point is one upon which we may rely, but I think the same may be accomplished by making a large incision with a sharp knife and then spreading the wound by a pair of hemostats. As to the second point, namely, the prevention of recurrence following this method, this can be true only to a certain extent, for while the majority of cases of peritonsillar abscess are the result of infection carried through the upper pole, this is not always the case. Even after a fairly successful tonsil operation one not infrequently finds that a few remaining follicles or a small amount of tonsillar tissue has been left. Through this lymphatic tissue it is not impossible for infection to take place, resulting in abscess in the adjacent tissue.

DR. W. V. MULLIN: Dr. Levy alluded to Dr. Bane showing

us the method of opening peritonsillar abscess some years ago, and I have always thought that the method of using the Hartman forceps was an ideal one. Drs. Wallace and Bane brought up one point that I should like to hear some further discussion upon, and that is the advisability of operating upon certain acute cases. I have felt that in well defined indications one should go ahead with the operation during the acute stage. I recall one case in a young woman where a peritonsillar abscess had been opened by her general practitioner three times. When I saw her she had a peritonsillar abscess on both sides which I opened, and they promptly filled up again. The throat was pretty well scarred, and she looked decidedly septic; was running temperature and had albumin and casts in the urine. I removed both tonsils under general anesthesia. I had a little more bleeding than ordinary; but the girl made a good recovery, and I feel that she would not have done so otherwise. In another case, a girl sixteen years old had tonsillitis and was taken care of by her family physician. When he called me there was nothing to be seen on the tonsils, but she had a large tender gland on the right side; had a temperature of 105; was partly delirious; had pains in the joints, and was developing a heart murmur. The gland was aspirated from the outside and nothing obtained. I removed the tonsil on the side of the infected gland, with no undue bleeding, and the girl made a good recovery. I would like to hear from anyone who has had further experience along this line. If you can get good drainage and relief from opening a quinsy abscess, all right; but if not, and your patient is not doing well, why not remove the tonsil just the same as an acutely inflamed appendix?

DR. WM. C. BANE: In suitable cases the advantage is in being able to reach the abscess by dissection with very little distress to the patient. However, the method which I usually follow is the one advocated by St. Clair Thompson. That is, "If an imaginary horizontal line be drawn through the base of the uvula, and another vertical one along the anterior faucial pillar, they will intersect above the tonsil. One or two centimeters external to this is the best point for opening the abscess." Finding a boggy area, with the point of a Hartman nasal dressing forceps, they are suddenly pushed backward

and outward until they enter the abscess, when the blades are spread and withdrawn, giving vent to the pus and producing an ample opening for drainage.

The Lothrop Operation for Frontal Sinuitis, With Report of Two Cases.*

JAMES J. PATTEE, M. D.,

DISCUSSION.

DR. F. L. DENNIS: I have had no experience with the Lothrop operation, and can only speak from what I have read. It seems to me to be a very useful means of approaching disease in this quarter, and I think Dr. Pattee's exposition of the technic of the operation has been very instructive. My own opinion is that I think Dr. Pattee is right on the point that we should not meddle too much with the linings of the sinuses. I think that sort of thing often results in more harm than good. In closing what little I have to say, I would like to ask Dr. Pattee if he will tell us a little more about his after-treatment following the operation, whether there is any drainage or not.

DR. F. E. WALLACE: I have had the privilege of seeing this second case Dr. Pattee spoke of, and the scar was so slight as to be unnoticeable.

In reference to the operation and the necessity for taking out part of the septum, it seems to me that would have to be determined by the particular case in which you are operating. You can easily imagine that a case like this, where you have the room that is shown here (indicating), it might not be necessary to take out the septum, because you would have good drainage. But supposing that you have an irregular frontal sinus and that the septum is off to this side, or that your angle here is closed. Now then, there are anatomic limitations to going out towards the eye, so consequently your drainage might be very imperfect. Inasmuch as Lothrop claims there is no reason why an opening into this other side should be detrimental, I see no reason why taking out part of this septum here should not be very advisable in order to get your free

*See page 677.

drainage that is essential for cure. As it was in this case, I think the operation is one of choice.

DR. W. V. MULLIN: I desire to show a photograph of a patient before and after operation upon whom I performed the Lothrop operation in 1915. I think it emphasizes what Dr. Pattee says about there being very little scar after the operation. The patient walked into my office with this orbital abscess broken through from the frontal sinus, which you see in this photograph. This operation impresses me very favorably in contradistinction to the Killian. There are so many elements to be considered in the Killian—one thing is the amount of deformity which may follow, and which means a good deal to the surgeon. I have heard Killian himself make the statement that he was not entirely satisfied with the operation and that too many of them returned in several years without a result or with a great deformity. You can at least say about the Lothrop operation that if you do not give the patient a perfect cure you do not leave him with an enormous deformity and an unsightly scar. The patient whose picture you see has been observed recently and has had absolutely no return of trouble. I am not convinced of the reason for removing the septum and opening into the other sinus if it is not infected.

Replying to Dr. Irvine of Salt Lake City, I would say that I worked in Halle's Clinic at the same time Dr. Ridges did and I have done the Halle intranasal operation, but I do not think that it would be at all applicable in the first case Dr. Pattee showed nor in the case I showed. In just such cases Halle himself would have done an external operation.

DR. D. A. VANDERHOOF: The keynote, I believe, in the healing of all these frontal sinus cases is simply one of free drainage. If you get good drainage, even with a small amount of operative work, you are fairly sure of getting a good healing. As Dr. Pattee says, all cases vary. Some of these cases, of course, it would not be possible to do the operation upon, which he has spoken of today, and so in these cases we would undoubtedly have to do the Killian or some similar operation. You take a case where the frontal sinus extends far over the orbit, the operation which Dr. Pattee has spoken of will not give you any results. The two cases which Dr. Pattee has

reported are very interesting, and we all should be benefited by his most interesting and instructive paper.

The doctor spoke of ether in these cases: In the more radical external operations, where the intranasal work has been done at some previous time in the office, I have always felt strongly in favor of nitrous oxid gas. The only objection to it is, in these cases you always get a great deal of bleeding, so you should use, previous to the operation, an injection of adrenalin to relieve excessive hemorrhage.

DR. J. J. PATTEE: With reference to the question of after-treatment and packing: I use no packing unless hemorrhage requires it. In general, I pack less and less after surgery in the nose. The patient reported, appeared very similar to the photograph exhibited by Dr. Mullin. This patient spent about three to five weeks in the hospital and home with each of his three previous intranasal operations, while after the Lothrop operation he was confined only a week.

The question has been raised about the danger of opening the opposite side. I do not apprehend any trouble from that source. It is a well known fact that much moderate acute sinus infection recovers without treatments; that quite severe cases subside on removing the anterior end of the middle turbinate, and nearly all cases heal after free frontonasal drainage. Why such anxiety over opening a healthy sinus whose nasofrontal duct is open? The gain in drainage greatly outweighs the risk of infection.

Dr. Irvine has raised the question of the Halle operation in my case. I did not regard the intranasal operation suitable for two reasons. First, the condition of the case made a successful intranasal operation seem very improbable. Second, the case had already had three intranasal operations without relief.

A New Instrument for Exenteration of the Anterior Ethmoid Cells.

FRANK R. SPENCER, M. D.,

BOULDER.

Since our instrumentarium is already overcrowded, the necessity for another instrument may seem doubtful to your minds, but, as those I have tried have not entirely fulfilled the requirements, I have ventured to introduce this one.

You will notice that this combines the curette of Mosher and the hook of Sluder. The latter is placed in the center of the bowl of the curette, as an additional aid in exenteration. The bowl of the curette is at a ninety degree angle with the shaft and is made to cut from above and behind, down and forward.

As Mosher's curette is intended for cutting backward, it is often desirable to have an instrument with which to cut forward, especially while removing fragments of the anterior cells. The bowl of Mosher's curette is at an obtuse angle with the shaft and cannot be easily used for cutting forward. In fact, if I interpret his article correctly, he did not intend to cut forward with his instrument. While a conchatome is a useful adjunct to the curette, it has its faults.

Perhaps if I had the master mind and hands of either Mosher or Sluder, I would not need this addition to my instrumentarium, but this has fulfilled some of the requirements not found in any of the others.

This instrument was made by V. Mueller and Company of Chicago.

DISCUSSION.

DR. W. V. MULLIN: I have looked at Dr. Spencer's instrument, and while it looks practical, I am sure those things get down to a matter of individuality, and Dr. Spencer had this devised to meet some requirement or some want that he has had filled. I am sure that I could tell very much better what I thought of it after I used it. I have used Dr. Mosher's curette and like it very much, and I am also much in love with Heath's small forceps for opening the ethmoids. I should like to try Dr. Spencer's instrument when I have the opportunity. As I say, I think it comes down to the instrument that a man is used to and what individual use he has for it.

DR. ROBERT LEVY: The instrument here presented seems to be very similar to the one known as the Grünwald curette. The curve and bowl are about the same, but the knife is entirely new. I have found that a curette set at this angle is of much help in doing what is known as the Mosher operation on the ethmoid.

The Surgical Treatment of Epistaxis.

FRANK R. SPENCER, M. D.,

BOULDER.

That certain types of epistaxis have long resisted conservative treatment is well known. That surgical intervention is often successful in the stubborn cases is now becoming well recognized. It is almost needless to state that surgical treatment is not applicable to cases of epistaxis due to acute infectious diseases, such as typhoid fever, pneumonia, or measles, nor is it applicable to a nasal hemorrhage, when due to the anemias, advanced arteriosclerosis with high arterial tension, etc. These cases should be treated by the internist rather than by the rhinologist. When repeated applications of strong iodine, nitrate of silver, Monsell's solution, and the chemical or electric cautery have all failed to check the recurrent attacks of nasal hemorrhage, surgical intervention is usually called for, especially in small children, who resent any form of nasal medication. Children should be operated under general anesthesia, but adults may often be operated under local, except in cases of neurotic individuals, who refuse to submit to any surgical procedure under cocaine.

Most authorities are not in favor of doing a submucous resection of the septum in children under thirteen to sixteen. It is usually necessary to apply this operation only to the bleeding point, even though the septum may be deflected. Leshure states that he very often finds septal hemorrhage in patients who have almost perfect septa. Such has not been the writer's experience. The vast majority of cases of epistaxis occur in people who have a sufficient deflection of the septum to call for operative intervention. For several years I had noticed improvement in crusting of the septum and septal hemorrhage following a submucous resection, but the full significance of this did not occur to me until I heard a paper by Dr. Chester C. Cott, of Buffalo, read before the section of otolaryngology of the A. M. A., in Detroit, in June, 1916. This paper was preceded by one by his father, Dr. George F. Cott, which occurs in the transactions of the American Academy of Ophthalmology and Oto-Laryngology for 1912, page 272. A more recent article upon this subject has appeared by

Leshure. Thompson and Prenn have also written upon this subject.

The method of operating is as follows: First, apply cocain and adrenalin to the septum. Ten to twenty per cent cocain may be used and is recommended by most authors. Personally, I prefer powdered cocain. Injection of one-half to one per cent novocain in 1/20,000 adrenalin, under the mucoperichondrium, well above the ulcerated area, increases the anesthesia. If injected near the ulcer, it will probably not remain long enough to anesthetize.

Second, incise the mucoperichondrium well anterior to the ulcerated area. Hajek's incision in the mucocutaneous membrane may be necessary in some cases, and in others Killian's curved incision is better. An L-shaped incision has been used. In any case, this must be carried well down to the floor, so as to elevate all of the ulcerated area.

Third, elevate the mucoperichondrium well beyond the bleeding area on the side of the ulcer only. If both sides are operated at the same time, a perforation will result.

Fourth, either apply pressure with forceps in order to obliterate the tortuous vessels and pack, or packing without the former is usually sufficient. The pressure with forceps should not be great enough to endanger the vitality of the tissues, but only sufficient to obliterate the bleeding vessels.

While I have used this in a comparatively few cases (ten or twelve), and then only when it was necessary to straighten the septum at the same time, the results have been gratifying.

DISCUSSION.

DR. ROBERT LEVY: Although I have never practiced the procedure mentioned by the reader of this paper for the cure of recurring epistaxis, I have been impressed with the frequency with which this result is obtained after a submucous resection of the septum.

DR. J. N. FOSTER: In regard to this procedure I have done it quite a number of times, and I have been successful in some very obstinate cases. I can remember a special one, a case that I had of an old lady with high blood pressure; constant bleeding very annoying to her. I went to see her and did everything in the world I could in the way of cauterization.

and at last did this operation, and I think she got somewhat better. I was afraid to go back and find out.

Relation of Blood Pressure to Pathologic Conditions of Head and Neck.*

T. E. CARMODY, M. D.

DISCUSSION.

DR. ROBERT LEVY: This paper is, so far as I know, the only investigation of its kind that has been attempted, and I wish to commend Dr. Carmody for this very original thought of his. That some good will come of it goes without saying, for we have only to look at other branches of our science to learn that investigations along the line of blood pressure have been of much value. We have a great deal to learn regarding standards from which to draw conclusions, and possibly a continuation of this research will develop these standards so that one may draw certain conclusions. The relation of a high or low blood pressure to an operative procedure, in either a minor operation in the throat or nose or in a major operation, has, I believe, received too little attention. The statistics presented by the essayist may be criticised somewhat in that we do not gain so much for a determination of averages as one would have from first thought believed to be true. I believe more value could be attached to this research could the averages be taken between various ages instead of making the one average age of seventeen the basis of deductions. One might with advantage study the average blood pressure between the ages of two and five, between five and ten, between ten and fifteen, and so on up to adult life.

In speaking of nasal hemorrhage and blood pressure, we are all familiar with the rapidity with which nasal bleeding, resisting all other methods of control, stops as soon as the blood pressure is reduced. In some cases, however, it requires much judgment on the part of the observer to determine that a moderately high blood pressure is responsible for the bleeding in the presence of a local lesion. For example, I have been satisfied that in a number of cases in which the blood pressure was high, the patient having passed the age of fifty, the hemor-

*See page 691.

rhage came definitely from an eroded anterior septal artery. In these cases the bleeding was controlled by galvanocautery, blood pressure remaining high at all times.

Dr. Robert Levy presented an informal report dealing with statistical deductions from an examination of four hundred and thirty candidates for the aviation service. He also outlined the methods adopted by the examining units, showing in what respect an attempt was being made to standardize these examinations.

The Nose and Throat in Medical History.*

D. A. VANDERHOOF, M. D.,

DISCUSSION.

DR. ROBERT LEVY said the subject of medical history is one that must interest all of us. In following the history of a given medical topic from its earliest day to the present time, one obtains a much better understanding of it. While the older history of otolaryngology is interesting, to me that period of the history of our specialty beginning about the middle of the nineteenth century is most valuable. You will recall that at this time, namely, about 1856, the laryngoscope was discovered. This was the beginning of our present method of illuminating dark cavities, and the entire subject was given new emphasis by bringing the nasal and laryngeal cavities into the light of day. No department of medicine has made greater progress in the last fifty years than otolaryngology, and the advances are so important that a close study of the history of our specialty during this period is of great value.

DR. F. L. DENNIS said, with reference to the way the Hindoos felt about putting things in the nose, one of the instructions was that the patient do not get angry when they pushed his nose up and squirted some oil into it. It reminds me of a patient I had before doing nose and throat work. This man came in with a very painful boil on the end of his nose, and I put him in the chair so that I could see in his nose

*See page 687.

and put a knife into the boil, very much to his disgust. He went away and told somebody afterwards: "I didn't mind Dennis sticking that knife into me, but after he got through he pulled my nose and that made me mad."

DR. WM. C. BANE said we speak of the eustachian tube. The name eustachian doesn't mean anything to you except as you have learned to associate it with the tube. Why not "otopharyngeal tube"?

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XLVIII.

THE AVIATION SERVICE OF THE MEDICAL DEPARTMENT OF THE ARMY.*

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It is now just a year since we were all assembled here facing the beginning of our part of the war. If you will remember, two problems were uppermost in our minds at that time: (1) How to utilize the men who had specialized in medicine so that their special services would not be lost by placing the round peg in the square hole. How this has been accomplished you are in position to judge. (2) How to organize an efficient aviation medical service. As it exists today, there is a large number of medical officers and enlisted personnel of the Medical Department serving with the Air Service.

It is the desire here not to treat the whole problem of the Aviation Service, but to take up the question of the vital care

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that should now be given to the individual aviator if we wish him to fulfill our expectations for him when flying over the lines. It is my desire to bring briefly but clearly to your mind what has been forcefully brought to our attention while recently in France as to the need of special medical care for the aviator. An opportunity was given both Major (now Lieut.-Col.) Isaac H. Jones and myself by the commanding general to see what is actually being done by Great Britain, France and Italy towards maintaining an efficient flying force. It is our desire to have you look beyond the building of machines and the enlisting of men for the aviation service and go a step further into a development which is even more recent than the art of flying. It is one thing to build machines and train men to fly in them; but another to maintain these men and machines in the air by the constant supervision necessary. This is a far-reaching problem, which is intimately involved in the evolution of the air service, and largely falls upon the medical service to keep these fliers at their greatest efficiency.

Bear in mind the three general subheads under which the Medical Division of the Aviation Section was endeavoring to send the maximum number of fliers over the top and to send them over in the best physical condition to accomplish the purpose. After all, it is the human machine that controls the situation. France today mourns the loss of many of her best fliers, which she describes as "Aces." Great Britain has suffered in a similar way, and has taken a decided stand in specially protecting her fliers while on the fighting line. She now realizes that her honor rolls, which are usually hung up in each squadron headquarters, are too often a measure of failure, not of the aviator, but of those responsible for his fitness at the time of his crash.

The three subheads are:

First—The selection of those suitable for flying;

Second—Their classification from a medical standpoint for duty with observation squadrons, fighting squadrons, day bombing and night bombing; and

Third—The maintenance of each aviator at his maximum efficiency.

What we have done, or are trying to do, I will try to briefly describe.

In the selection of prospective fliers the Medical Division has been able to carry out the physical examination by trained examiners in different centers throughout the United States. Thousands of men have been examined, from whom were selected a body of men who today, physically, have no equal in this or any other country. And further, we have enough to lend our allies a considerable number should they need them.

Having now aided in this selection of aviators, it has been found out that our real work has just begun. These men are either in France or in this country, actually flying or undergoing instruction. It is not enough nowadays simply to be a normal man to be fitted equally well for the different types of flying now demanded. High as the standard has been, we now realize from the work abroad, that we can go a step further and determine just what type of flying an individual is physically best fitted to perform. The question that confronts us is how can we determine as early as practicable just where each pilot belongs. Certainly not by guesswork, individual impressions, nor by the fact that a pilot does not return after a flight.

It is fully realized that the final test comes in the air, but it is even more fully realized that the first test should not be in the air but by the most careful examination possible as early in the course of training as it can be carried out. As an example, to make a pilot with a poor light sense (his vision otherwise normal) fly at night is suicidal; equally so to compel him to do altitude flying when it can be shown to a certainty that he will faint on reaching ten to twelve thousand feet. If these pilots were properly classified the man with the poor light sense but otherwise normal should and would be able to do satisfactory service as a day bomber; the pilot who, otherwise normal, could not fly at an elevation beyond ten or twelve thousand feet, might well be able to do efficient service in an observation plane which is not intended nor able to ascend to these altitudes. These examples are mentioned to direct your thoughts as to how very practical research of this character can be made.

Finally, it is not enough to select a flier and then to classify him unless he is to be maintained at his maximum efficiency. It is here that the trained medical man, as an adviser to the commanding officer of each aerodrome or flying school, can give that same close supervision to the human machine that is now given to the aeroplane itself. In 1915 there were many accidents in the Royal Flying Corps due to physical defects of the pilots. When this became known, the physical entrance requirements were made more rigid. The rate fell rapidly in 1916, and still further in 1917. No country can afford to sacrifice its fliers from causes which are preventable.

In order to carry further this maintenance of the efficiency of every flier in the Air Service, authorization was obtained for the creation of the position of flight surgeons and physical directors. A flight surgeon is a medical officer whose duties will be to have charge of all that pertains to the physical well being of the cadet flier. Many of the flying schools have already been provided with flight surgeons. Medical men to fill these positions are most carefully selected, with a view to their special fitness for a class of work which requires good medical training, excellent judgment and special knowledge of the medical problems involved in the flying service. After selecting prospective flight surgeons, they are sent to the Medical Research Laboratory for intensive training and then to a flying school. Before long every flying school will have a flight surgeon.

The physical directors are being selected from the well known coaches, physical directors and trainers of our various colleges. These directors are taken in as First Lieutenants in the Sanitary Corps, sent for a short time to the Medical Research Laboratory for a special course, and then on to the flying schools. Their duty will be as assistant of the flight surgeon in everything that relates to the training of prospective fliers, and to occupy a position to the flier similar to that which they occupied in athletics in the various universities from which they come.

You will see from the foregoing that the personnel of the flying schools will be treated very much as an athletic section of a university, with the flying instructors acting in the capacity of the coach, the flight surgeons as athletic or team sur-

geons, and the physical directors, as physical directors or trainers. It is the purpose so to regulate the lives of the cadet fliers that they will be in good condition at all times, neither undertrained nor overtrained. It is realized that the game to be played is not one of a day or a season but of years, and their condition must be made to conform to this extension of the time limit.

It is proposed to have the Food Division in the Surgeon General's office supervise the diets at the flying schools. The importance of the training table is too long established in connection with our various athletic teams to require any urging on my part of its great need.

Early in the organization of the Aviation Division of the Medical Department it was seen that many of the problems would require a very efficient research board to help to solve them. Such a board was created about a year ago and has now extended its functions by establishing laboratories at many of our flying schools. The main laboratory will naturally do most of the research; the branch laboratories will be largely concerned in classifying our fliers.

The above sketch has been given with a view to presenting in a brief way the special features involved in the flying service, which is entirely different from other branches of the military service. Because of these differences, the Medical Department assigned to duty with the Air Service naturally, in addition to the usual difficulties involved in caring for a body of troops, was compelled to deal with these special and unknown problems in addition. Our losses from accidents in the air so far have remained small. It is expected that the medical organization will not only be able to lessen these but will prove invaluable on the other side, where our fliers naturally must operate under most exhausting conditions.

XLIX.

OTOLARYNGOLOGY IN THE ARMY MEDICAL SERVICE.

BY MAJOR NORVAL H. PIERCE, M. C., U. S. ARMY,

CHICAGO.

Mr. Chairman and Gentlemen—In the synopsis you will see that I begin my remarks under the heading of the personal equation. That which I have to say under this heading is in a way an answer to the many inquiries that have been made to me by men not in the service.

Military discipline has for its purpose prompt, complete, efficient obedience; from "Reveille" to "Lights out" this military influence, which has that purpose, is felt by each man that enters the service. You can readily understand that a group of men suddenly entering this changed environment from civil life will react variously. It has, therefore, been considered necessary that among the qualifications of an efficient medical officer "adaptability" is the one which scores for or against a man. Some men become very unhappy at the beginning of their service; some less unhappy, but the majority take to military life with a hearty good will. But it does not take long before the machine grinds us all down to a certain degree of polish—because it is polish—and I want to say right here that the men who have been in Camp Grant for nine months are now to a man, pretty nearly, not asking the question, "How can I escape?" but "Shall I stay in the service after the war is over?"

There is an immense fascination in camp life. It is remarkable how very soon you become completely separated from the old civil habits. There is a kind of monastic quality about cantonment life. You will be surprised when I tell you that during the last winter, which you know was very severe, there were weeks when men—medical men—never left the confines of the camp. Their whole life was taken up with the treatment of sick soldiers and the study of medical problems, and the time passed like a dream. We live with

our sick there, we had them with us all hours of the day and night, and the best of it is we were with them. We could go to the wards at any time, we could discuss the medical problems at meals, through the evenings, in barracks. At hand there were completely equipped laboratories with a first class chief, there were lectures, there were clinics, there were quizzes—a whole life full of this study of disease, and it has had a tremendous developmental effect on these men. They have advanced as they could not possibly have advanced under ordinary civil conditions in many times the months that they were out there. Do not fear to come into the military family. If you are one who enjoys comradeship—and who does not—you will find in camp life the conditions that bring it to richest fruition.

If I were called to tell what I considered the best thing in a medical sense that I got out of my experience at Camp Grant I would say that it is the realization of what efficient results may be attained when medical experts really work together. Departments there have been in close cooperation. We have had a wonderful personnel at Camp Grant. We all think that our particular personnel is the best of any camp in the country. This body of men has worked together in the finest kind of cooperation, we have discussed frankly all kinds of cases, so that now we no longer regard a meningitis as something that comes only from a suppurative ear. We have an entirely different conception of air borne diseases. We no longer regard the nose merely as a harboring place for catarrhal disease. We realize more vividly now that the problem of disease of the upper respiratory tract is much greater; it embraces scarlet fever, diphtheria, mumps, measles and pneumonia. I would say that this broadened view is probably the best thing that has come to me out of my experience. I trust that the other departments have felt the enlightening influence of the Department of Otolaryngology.

Now, to get down to the otolaryngologic problems proper, the first point to consider is the proper conception of the function of the otolaryngologic clinic of a cantonment. A base hospital otolaryngologic clinic may be built up just as one might build up a private practice. One may be ambitious to have a large number of patients, to which end it might be

largely a matter of applying sprays, douches, ear inflations in multitudinous incidental, inconsequential affections. I cannot say that that has been the policy at Camp Grant, first, because I believe it is unavailing in its therapeutic results, and second and very important, because it takes the man away from his military training. A cantonment in war times is a place where the first object is to train soldiers to military efficiency in the quickest possible time. If you have soldiers coming up to the outdoor department of the base from their commands, which are situated miles distant from the hospital, because of slight catarrh, because of this, that or other slight disease or inflammation of the nose or throat you are taking them away from their duties, and you are interfering with their military training. This is also true of those cases that really require treatment, namely, suppurative disease of the ear and chronic purulent processes in the accessory sinuses.

Medical chiefs have all had a pretty free hand, I must say, in the development of various departments. Our policy at Camp Grant has been to have as few men come into the clinic as possible. If a man has a chronic suppurative ear, he had better not be sent to a cantonment, because a cantonment is not the place to do radical operations of this kind. These operations should be either done at military hospitals which have to do with special reconstruction work, or better, they should be operated on in civil life before they are enlisted. Men with dry perforations of the ear drum have proven a source of contention. When a man is exposed as a soldier must be exposed, to the inclemency of the weather and to fatigue, a dry perforation almost invariably becomes a wet perforation and the ear begins to discharge. This holds as regards large central perforations as well as small marginal perforations. Quite a percentage of patients coming to Camp Grant Infirmaries have been men who have had in the past dry marginal or central perforations. Fortunately, we have a way of disposing of these men now, as they can be enlisted for special service only. They are not sent abroad; they are used in this country in whatever field they are best adapted.

It would be a great mistake to send a man away from the army who is a good electrician or a good carpenter or a mechanic of any kind, because he has a running ear. He should

be retained in the service where his special skill is most needed and where his affliction can have better care than it could in civil life. The department has comparatively recently taken this view of the matter, and the matter has been most intelligently adjusted.

Another point which should be taken up is that of otosclerosis. No difference whether the otosclerotic has hearing sufficient to pass the examining board or not, he should not be taken into the army for full military service. The medical men examining these cases should have proper appliances for the diagnosis of these cases, and they should never be accepted for full military service, no difference at what stage of the disease, because my experience in camp this winter has accentuated a fact that has been well known for a long time, that fatigue and exposure or overheating of the body are very deleterious to these cases, and a number of the men who in the beginning had only a slight deafness from otosclerosis, at the end of the winter were markedly hard of hearing.

The operative work at Camp Grant has been largely of a minor character, consisting mostly of tonsillectomies and corrections of septal deviations. We had only about thirteen cases in which the mastoid was operated on for acute mastoiditis. I say this with a great deal of pride. It is in strong contrast to the experience of some of the other cantonments, which have had a couple of wards full of acute mastoiditis cases which have been operated upon. This is not because we have had no streptococcus infection; it is not because we have had a different streptococcus infection; it is not because our men have had greater resistance to disease—at least, it is not to be altogether explained by any of these circumstances. It is largely to be explained, first, by the correlation of our working force. For instance, one of my officers has for his duty the daily inspection of the wards for contagious diseases, so that whenever an otitis media developed in these cases, as you know they do very frequently, it was immediately detected and a very early myringotomy was performed. We never waited for rupture; we did an early paracentesis if there was any possibility of there being fluid in the ear. We did not wait for bulging. This was done

under strict antiseptic precautions. The external auditory canal was disinfected and washed, then painted with iodine and then an ample myringotomy performed. After the tympanic membrane is incised, a fifty per cent alcohol dressing is placed over the ear and mastoid region. The ceaseless, painstaking care of these cases contributes the first reason why we have not had many mastoids that came to operation.

The second reason was that we used the accumulated knowledge of otology in recognizing the fact that it takes three weeks in nearly all of the cases for decalcification to take place in the bone between the pneumatic spaces. There has been but one case operated there within the first week, and that was a fatal case. It was a case of primary isolated thrombosis of the jugular bulb. This soldier had a recrudescence of an apparently mild otitis media and was operated on the day after his entrance into the hospital, and even at that time there was a cordlike swelling along the jugular very nearly to his clavicle. On opening the mastoid there was no softening; the bony wall of the sinus was normal, as was the membranous sinus, and therefore the operation of the mastoid had nothing whatever to do with his demise, nor would it have had anything to do with his recovery had it occurred. The day after the operation the thrombosis had extended to his arm, so no difference what kind of an operation is performed in such a case, the result is hopeless. With that exception we have had no deaths from otitic disease. This experience, together with that of a long series of years at the Illinois Charitable Eye and Ear Infirmary has proven to me that early operation on the mastoid is very rarely indicated, and then only when there are complications threatening the involvement of the neighboring structures.

We have examined some two hundred aviators, balloonists and observers. I wish to say that I regard the position taken by some recent writers that the examination of the static apparatus is very reprehensible if not altogether unnecessary and unduly accentuated. I cannot understand why we should not find out whether an aviator's static apparatus is in working order, just as much as we should ascertain whether his visual apparatus is normal or not. That we may discover other tests that may be highly useful and supplementary, I

do not doubt; but if we were to abandon the tests as now carried out to ascertain the functional ability of the static apparatus in applicants for aviation service, we would be doing a dire wrong to the men who go into the air.

Now, otolaryngology is very important in the work at Camp Grant, but we do have to do a lot of other things that give the day a great deal more meaning and color than it would otherwise have, such as drills, setting-up exercises and administrative work. Some of our otolaryngologists have turned out to be A1 administrators; some are turning out to be first class drillmasters, and some men divide their spare time between the two vocations.

Abroad I believe there will be a very valuable field for the otolaryngologist, especially when the units working on the head surgery are developed. There is no doubt that the rhinologist and otologist can give very valuable information to the brain surgeon, and injuries of the neck which involve the trachea and larynx can best be dealt with by the laryngologist.

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EARLY LARYNGOLOGY IN PHILADELPHIA.

BY J. SOLIS COHEN, M. D.,

PHILADELPHIA.

When returning to Philadelphia after the close of the Civil War I began to resume practice, I took up the study of laryngology as a specialty at the suggestion of my friend, Dr. Elsberg, of New York, beginning with Morell Mackenzie's little volume on *The Use of the Laryngoscope*, as a textbook. I became one of the outdoor visiting physicians of the Northern Dispensary, and that gave me the run of the dispensary itself for opportunity to practice the art.

After a little while I became able to get a good view of the larynx, and I well remember how, at my first success, I felt as though I was in communion with my Creator, seeing the hidden parts of the economy.

I had a number of friends in the dental profession who took an interest in my efforts on account of the similarity of the laryngoscopic mirror to the dental one. It was during the early days of the use of nitrous oxid gas in dentistry, and some of these men used to give the gas themselves. They would allow me to use the mirror on their patients during the interval between the withdrawal of the teeth and the coming to. I sought to induce them to use the reflector on dull days but they did not take to it. In this way I acquired considerable skill in the use of the laryngoscopic mirror, and sometimes got a case to treat. Some of these cases I exhibited at the meetings of the Northern Medical Association, and thus gradually had paying cases referred to me. As my practice increased I bought more books, and more instruments as they were required, and some of these cases I published, chiefly in the *Medical Record*, of New York, for which journal, thanks to my acquaintance with its editor, Dr. Shrady, I had engaged to make extracts for foreign journals in exchange for the journals themselves.

One day Dr. Shrady suggested that I write for the Record a systematic series of articles on Laryngoscopy, which I did, and thus became to be known outside of my own community.

Shortly after, Dr. Bertolet came from Europe, where he had studied the subject, and with his aid and that of Dr. La Roche, who had become interested, I decided to open a private clinic, which I did in Ninth street, opposite the University of Pennsylvania buildings, in a couple of rooms just vacated by the orthopedic and nervous dispensary run by Dr. Thomas Morton and Dr. S. Weir Mitchell, who had removed to their present location.

Most of our patients were sent by my good friend Dr. Slocum, the physician of the Northern Dispensary, but it was a long time before we got any students. It was a little hard to keep the patients, too. Sometimes I had to pay them for coming so that we should not be out of material should we have any professional visitors.

After a while I thought it time to begin a course of lectures, so I rented the use of Dr. Agnew's anatomic room in Chant street, now part of the Post Office building, for two nights a week and got out a prospectus which I tacked up on the bulletin boards of the university and the Jefferson.

I went to one photographer after another to get some enlargements made of laryngoscopic images for purposes of class demonstration, but I could not get them to do it for me. They all thought the pictures were those of the female genital organs and indignantly refused. So I had to go to New York where I found the photographers were not so fastidious, and got some splendid reproductions, which were used successfully for a number of years.

Well, the course was to be opened, and I had sold but two tickets, both to Jefferson men, one of them Dr. Graham, subsequently professor of surgery in the Denver Medical College, and the other to Dr. Watson, of Hot Springs, Arkansas, subsequently a noted practitioner in his own state.

The first lecture was attended by Dr. Watson only, but I did my best and lectured as enthusiastically as though the amphitheater was crowded.

At the second lecture I had no audience, not even the janitor, and just as I was giving up, Dr. Graham came in and I gave him the lecture all to himself. This went on for a week or two, only one or the other showing up at a time, when finally, as I was entering the room I heard the end of a conversation like this: "Hello, Watson, are you attending this course of Dr. Cohen?" "Yes," said he, "and are you?" "Yes, I am, too, but I have always been the only one." "Well," said Watson, "let's come together after this and give the poor doctor a class."

"Well, the thing got around the college, and after that there were always these two, and once in a while one or two more who dropped in to see the doctor who was lecturing at such odds.

The next year I had perhaps a dozen students, and so it went for a year or two, and I wrote a little primer on "How to Use the Laryngoscope."

I used to attend Prof. Gross' clinics to report them for the Medical and Surgical Reporter, who paid me at the rate of five dollars per clinic.

One day Dr. Gross introduced me to his class ironically, as a man who was devoting his energies to a single cubic inch of the human anatomy, and when the laugh he raised had subsided he added, "and some day I suppose some specialist will confine himself to diseases of the navel."

So you see the respect shown to specialists in those days. Later, however, Dr. Gross always got me to lecture on laryngoscopy before his class, and engaged me to write the chapters on Diseases and Injuries of the Air Passages in the last edition of his Surgery.

Shortly after this the university got up a summer course of collateral branches, leading to the degree of Ph. D., and the next year the Jefferson got up a summer course on some practical branches and made me lecturer on diseases of the throat and chest, with the understanding that I should bring my clinic into the building, where it became established in the dark chamber under the amphitheater where the regular clinics were held.

Gradually we forged along until finally quite a respectable clinic was formed, with a very fair attendance of students.

I had a private student at this time attending the university, Dr. Carl Seiler, who, as well as my first assistant, Dr. Bertolet, was a good pathologist, and both were very properly looked upon as leading men in the Pathological Society and for quite a while we four were the only laryngologists in Philadelphia.

A fairly good laryngoscopic joke may be interpolated here. Dr. Seiler was examining a woman's throat one day, and not seeing anything wrong in the larynx, remarked, "I think your cough must be a reflex from an irritation in your womb," and the woman replied, "Doctor, if I'd thought you could have seen so far down I would not have allowed you to put that looking glass in my throat."

Faber's talking machine was brought to Philadelphia, and Faber brought me a letter of introduction from a medical acquaintance in Germany. This talking machine was an imitation of the vocal cords in thin ivory moved by cords, the levels of which were worked by a piano key arrangement, and the artificial larynx was enclosed in a rubber head, the lips of which could be moved and the posterior nares of which could be occluded by means of cords also worked by the piano keys, and so a good many words and short sentences could be admirably imitated.

The faculties of the University and of the Jefferson readily accorded me permission to lecture on the voice at both institutions with this apparatus in demonstration, and I gave one lecture at each college to audiences which filled the rooms.

I was getting better known in Philadelphia, because I had just delivered a course of lectures on acoustics at the Franklin Institute and at the Institute of Technology at Hoboken, when that institution was formally opened.

And so laryngology gradually crept into repute.

I was allowed to give clinics at the Jefferson before the entire class, and I well remember the first time the dental engine was ever used in rhinology.

A physician from India came to Philadelphia to get rid of an obstruction in his nasal passages. It was found to be bony, and the case was referred to me. At that time Bonwill's dental engine was coming into use in dentistry, and I determined to try to bore through this obstruction with it. So I

went to one of my dental friends and he taught me how to use the drill, and consented to come to the clinic and help me if I failed to get through. Dr. Keen was one of the clinical surgical assistants at that time, and he suggested that the great heat of the friction might do harm, and proposed, with my consent, to keep spraying the parts with cold water as I proceeded, which he actually did, and in this way the operation was performed, Drs. Gross, Pancoast, Levis and others being present.

It was in '67, I think, that one of the professors of the University, at the suggestion of Dr. John Atlee of Lancaster, placed his son under my care with a growth of the larynx. I removed several portions with forceps, and the fragments, examined separately by Dr. Da Costa, Dr. Wm. Pancoast and Dr. Woodward of the Army Medical Museum at Washington were pronounced epithelioma. So I determined to open the larynx and remove it externally, and get my friend Dr. Elsberg, of New York, to come over and help me.

There was a very distinguished audience present, as it was the first attempt in Philadelphia to remove an epithelioma from the larynx, and several surgeons were anxious to see it. There were Dr. John Atlee, the patient's physician, a celebrated surgeon, best known in connection with ovariectomy, a surgeon of the navy, a personal friend of the patient, Professors Gross and Pancoast, Dr. D. Hayes Agnew, Dr. Richard Levis, the younger Drs. Gross and Pancoast and one or two others.

After the larynx was split and held aside by Elsberg, just as I was about to attack the growth, the elder Gross put his mouth to my ear and said, "Cohen, be sure you remove the very atmosphere of the damn thing." I removed it very thoroughly, scraped down to the cartilage, rubbed in acid nitrate of mercury, and then let the edges flop. I did not put in a suture. The man recovered and died twenty years later of apoplexy.

This was the case Prof. von Bergman of Berlin referred to in his account of the case of the late Emperor Frederick of Germany, and said that this was the operation he had intended to perform, and not removal of the larynx, as had been declared by his antagonists.

This was perhaps the most successful removal of a cancer of the larynx of its day.

But there is a still better operation which I devised a number of years ago, in these cases of intrinsic carcinoma of the larynx, and that is not to touch the growth at all, but to strip the cartilage of its inner epichondrium with all the soft parts and then sever the flap with serrated scissors. The vessels from the outer perichondrium supply sufficient nutriment to nourish the denuded cartilage and thus repair the loss.

One day the late Professor Harrison Allen came into my office complaining of conjunctivitis which hampered him in finishing his great work on anatomy which was being published by the Leas, and I said to him, "Allen, let me cure your nasal catarrh, and the conjunctivitis will get well of itself," and he replied, "Why, you can't cure nasal catarrh." "Let me try," I answered, and when he consented I immediately flushed the parts out with the nasal douche and then covered them with a weak solution of silver nitrate. His catarrh gradually improved, his conjunctivitis subsided, he finished his book, and became so enamored with rhinology that he gave up his general surgical practice for rhinology and laryngology, and soon became one of its leading exponents, and acquired such an extensive practice that he had to relinquish his professorship at the university to attend to its demands. He devised a number of operative procedures—most of which, however, have become superseded.

After a while Dr. Seiler was given a lectureship in the university, and did most excellent work there for many years. He conceived the idea of concentrating the saline ingredients of what was known as Dobell's solution for the nasal douche, into a tablet, which in solution should have the actual specific gravity of the blood so as to avoid exosmoses or endosmosis. These tablets have had a world wide reputation and extension. Those on the market are not made in exact accordance with his formula, which is in the hands of Mr. Charles Dodson, an apothecary in Fourth street below Chestnut, Philadelphia.

As in all other departments of practice, both in medicine and surgery, there have been fads and fashions.

We had the nasal douche, a sort of fountain syringe, which lost credit because care was not taken in its use to breathe

continuously through the mouth and thus avoid forcing the liquid up the eustachian tube in the act of swallowing, which produced a good many ear troubles, but it is a good sort of flush used properly and at a sufficiently high temperature. Cold solutions and the act of swallowing during their operation are injurious, and as these precautions are not always avoided by patients, it is best not to use it.

Then we had a great fad of snaring off the posterior tumefactions of the lower turbinates, with the Jarvis snare or some of its modifications, the best of which was that of Dr. Sajous, one of my pupils and one of my successors at Jefferson Medical College.

We had also a long series of operations for sawing off spurs of the nasal septum or of boring through them with the dental and later the electric drill. I don't know how many different varieties of saws were devised from Bosworth's adaptation of the digital saw to De Vilbiss' series for attacking spurs of all varieties of deflection.

So, too, we had a prolonged season of electric cautery work for enlarged turbinates, destruction of morbid growths in larynx, pharynx and rhinopharynx. Great long electric cauteries for removing nasal polypi. Now these methods are used only in appropriate cases, but in the early days of laryngology, in Philadelphia as elsewhere, these methods were used almost promiscuously.

I must not neglect, in conclusion, to state that we formed a laryngological society in Philadelphia in the early '70's, I think. Bertolet, Seiler, Sajous, Allen and a few others, including myself, were members, but it lingered only for a while and gradually died for want of nourishment.

SURGICAL PATHOLOGY OF THE MASTOID.

By J. C. BECK, M. D.,

CHICAGO.

The surgical pathology or, more correctly, the pathologic anatomy of the mastoid process takes into consideration only a definite anatomic area, although it is probably never solely involved. Usually the middle ear and at times the internal ear are associated in the pathologic process. Neither of these will be considered in this paper.

The pathologic changes are subdivided in the first place into gross or microscopic and minute, histologic or microscopic. A further division is absolutely essential, and that is acute, chronic and acute exacerbation of a chronic disease. The anatomy of the mastoid process, the bacteriologic elements, the general conditions of the patient as well as his management during an attack of mastoid disease, will determine the pathologic changes. The discussion of these factors are not within the title of this paper, but I would like to say that the radiology, the laboratory, the medical teammate, and hospital practice will go a long way to modify these pathologic changes.

Acute Mastoiditis Gross Changes.—I have divided them into two great classes based upon the study of cases operated upon and examination of microscopic sections. These I have named: (a) Cell route or confluent mastoiditis; (b) Vascular route or osteophlebitic mastoiditis.

In the former we find often an external fistula over the antrum or near the tip, with considerable infiltration of the periosteum. The bone bleeds easily and at times appears darker, due to the edematous and engorged mucous membrane under the thin cortex. As soon as the latter is removed a fair quantity of pus escapes, depending upon the presence of a fistula and type of microorganism present. The bleeding is usually very free (to a novice it may appear as though the

sinus is opened), and the lining membrane usually protrudes through the opening made. The intercellular septa are usually broken down, either over the antral region or the tip, and at times both. Not infrequently in this confluent form there is an exposed area of the lateral sinus, digastric fossa or dura. In the vascular route or osteophlebitic type of acute mastoiditis we find microscopically the tissues overlying the cortex very little changed. The latter bleeds very little if any, and has otherwise a fairly normal appearance. On opening the mastoid we find the bone, however, very red. There is little or no pus escaping. The cells are well preserved, and their lining membrane is not very edematous, in contradistinction to the cell route type of infection. The preserved intercellular septa on close inspection show the marked engorgement spoken of above, and only in a later stage in which a possible secondary infection takes place can one find any exposures of the lateral sinus, although there may be an infection about or within it. It is this form of mastoiditis that has the greatest of percentages of perisinus abscess and sinus thrombosis developing, due to the extension by the venous infection from the bone. The same is true of the other vital neighboring areas, as the dura of cerebrum or cerebellum, the labyrinth, the facial canal and the digastric fossa. The histologic changes will be described later by the aid of microphotographs.

CHRONIC MASTOID DISEASE—GROSS CHANGES.

From the study of a sufficiently large number of operated cases and the subsequent microscopic examination of particles of mastoid bone removed, I have been able to identify or classify the changes in the following:

1. Osteofibrosis or sclerosis.
2. Osteofibrosis with fistular tracts.
3. Osteofibrosis, fistular tracts and cholesteatomatous infiltration.
4. Osteofibrosis, fistular tracts, cholesteatomatous infiltration, with cavity formation of cholesteatomatous masses.
5. Tuberculous osteitis.
6. Syphilitic osteitis.
7. Actinomycotic osteitis.

8. Reparative osteitis.
9. Foreign body in mastoid.
 - (a) Sequestrum.
 - (b) Any other substances.
10. Neoplasms.
 - (c) Sarcoma.
 - (d) Carcinoma.
 - (e) Endothelioma.

Gross Pathology, Osteofibrosis.—As the name implies, the mastoid bone is converted into a more or less solid bone. The cortex is hard and bleeds very little. The cells are conspicuous by their absence, and oftentimes not a single cell is found until the antrum is reached. If any cells are present then they are very small and are located in or near the tip. The degree of sclerosis depends a great deal upon the form of the mastoid—whether pneumatic or diploeic. That is to say, that in the latter form osteofibrosis is easier and more complete. The histologic findings of all the chronic conditions will be described later by means of microphotographs.

Osteofibrosis With Fistular Tracts.—Practically the same findings are encountered as in the preceding form, except that a few cells are met with and a number of tracts lined with granulation tissue. The bleeding is also more pronounced. In these cases there is frequently found an exposure over the promontory of the horizontal canal as well as the tegmen, a condition well to remember in the acute exacerbations as causes of brain abscess, meningitis and labyrinthitis. The facial canal and bony lateral sinus wall and other portions of the labyrinth are less frequently the seat of these necrotic areas. These necrotic areas are usually covered with granulations, and it is considered bad practice to remove them, as they serve as protection to further septic invasion.

Osteofibrosis, Fistular Tracts and Cholesteatomata.—Again the same pathologic changes are found as in the previous two varieties mentioned, and in many cases the cholesteatomatous changes are not possible to make out grossly in the mastoid, but are microscopically. However, when the antrum, aditus and attic are exposed, one will be able to remove a considerable mass of cholesteatomatous material. All are familiar with the characteristics of these masses, but they can be

further identified grossly by the Bruehl test by adding a few drops of chloroform, when the mass will turn a yellowish green (cholesterin). The microscope will always demonstrate the characteristic crippled epithelial cells.

Osteofibrosis, Fistular Tracts, Cholesteatoma, With Cavity Formation.—The cavity that is found in these cases varies in size from a small marble to that of the mastoid process and in some cases beyond it. The location of this cavity may be at the tip, over the antrum or continuous with the attic to the antrum, the so-called spontaneous radical mastoid operations.

Pressure atrophy of the bone due to the continuous formation of epithelium in layers like an onion, plus the necrosis due to the infection, is the explanation of this cavity formation. These masses often contain particles of necrotic bone (bone dust). The cavity itself is lined by a glistening membrane known as the matrix, from which the new epithelial cells form. This matrix is not a mucous membrane nor skin, not even an epithelial cicatrix.

Tuberculous Osteitis of the Mastoid.—Grossly this condition cannot be identified except that it may be suspected when the fistular tract formation is very marked, even finding one or more on the cortex. Again, there are often softened areas of considerable size, surrounded by very dense bone. Granulations are also more numerous throughout the process. Actual collections of pus are present, in which, however, I have never found the bacillus tuberculosis.

Syphilitic Osteitis of Mastoid.—This is as a rule a sclerosed process but not eburnated. At times it is entirely softened, containing sequestra of considerable size. The granulations surrounding such a sequestrum are large or flabby and do not bleed very much. The three cases of this type which I have identified with subsequent microscopic examination all had the characteristic of having very little calcarious material remaining in the bone.

Actinomycosis of the Mastoid.—Two cases are thus on record, one by Majochi, and the other I had under my service with Prof. Zaufal and Pathologist Prof. Chiari. We found the mastoid bone, including the cortex, practically riddled with fistulæ, containing thick pus in which there were yellowish bodies (actinomycosis). The bone was quite soft otherwise.

. **Reparative Osteitis of the Mastoid.**—The pathologic process refers to the reoperated cases. The previously exenterated cavity is either filled with granulations, cholesteatomata, or both, or it is lined by the characteristic epithelial scar. The bone of these cavities is as a rule very hard, and the edges or margins of said cavity are thickened and irregular. It always appears (especially if one does the reoperation on his own case) as though the cavity was much smaller than when it was made at the previous operation. Bleeding very free from these granulations as well as the bone. There can scarcely be a description of the various parts of the mastoid, since each case is an entity of its own.

Foreign Body in Mastoid.—(a) In the sequestered type which is, except in the already described syphilitic osteitis, most frequently met with in children, usually the result of an incomplete simple mastoid operation, especially in the cell route or confluent variety. These sequestra are always surrounded by somewhat healthy granulations, bleeding very freely. The sequestrum is usually very easily dislodged, is irregular in shape and has the appearance of being the part of several cells. At times these sequestra are very small, flat, with very pointed extremities. (b) As to other foreign bodies, they may be shots of bullets, shell fragments, parts of instruments, knife and scissor blades. Surrounding such foreign body is usually an infected area with or without granulations, depending upon the length of time that the foreign body has been in the mastoid.

Neoplasms of Mastoid.—All the three varieties, sarcoma, carcinoma and endothelioma, I have had, but they were always the results of these growths in the vicinity of the mastoid. In the case of sarcoma it was a case of retromaxillary tumor that finally involved the mastoid process. In the carcinoma it was the result of a progressive epithelioma of the external ear, and in the case of endothelioma it followed a primary growth of that nature from the middle ear. The gross pathology was that of malignant disease of bone anywhere in the body, except that it was complicated by secondary infection.

The microscopic changes are also those characteristic of sarcoma, carcinoma and endothelioma. The type of endothelioma in this particular case was endovascular.

LII.

A NEW CAMP DISEASE OF THE LARYNX: "PNEUMOCOCCUS ULCERATIVE LARYNGITIS."

BY FREDERIC D. OWSLEY, CAPT. M. R. C.,

BASE HOSPITAL, CAMP TRAVIS, SAN ANTONIO, TEXAS.

Since my assignment to this hospital, December, 1917, we have had in the otolaryngologic section, a form of laryngitis heretofore undescribed in the literature.

In February, 1918, I reported seventy cases to the Surgeon General, U. S. Army. Since then I have had fifty additional cases.

This is a laryngitis showing ulceration of the vocal cords in the initial stage of the disease. The laryngeal picture at the onset is that of a bilateral ulceration of the mucosa, usually with symmetrically opposed patches on the anterior third of the cords. These patches are generally elliptical in shape, situated on the superior surface of the cords, involving their free border. This anterior position is not constant, however. In some of the cases I have found the ulcerations on the center of the cords, but their predilection for the anterior third is so constant that one may describe it as characteristic of the disease. While in some, the ulceration may extend so far as to involve the entire free border of the cords from the anterior commissure to their arytenoid attachment and may ascend above to the ventricular bands and descend below to the subglottic structure, I have never seen it extend posteriorly beyond the arytenoids.

The great majority of these cases (85 per cent) have shown a plaque form of ulceration with grayish patches, with a preference for the anterior half of the cord at all stages. On account of their anterior position so close to the anterior commissure, they may be easily overlooked in cases with an overhanging epiglottis, as these ulcerations in the beginning are from but five to seven millimeters long.

Etiology.—The predisposing causes are the same as those of other inflammations and infections of the mucosa: Lowered

vitality, following debilitating diseases, such as measles, pneumonia, mumps and bronchitis, which have largely prevailed in this camp.

According to the histories, the majority of these patients are among those who have been camping out on the rifle or artillery ranges or who have taken the thirty mile hikes to and from them, during these Texas northers. Eighteen cases gave a history of measles, two or three weeks before the attack; three, of pneumonia, and three of mumps; the remainder traced their origin to exposure, to the sudden extreme falls of temperature, from 20 to 60 degrees, and high winds accompanying the northers. However, I think I can claim a specific local infection as the real cause, in conjunction with these predisposing elements. In forty cases I was able to obtain laryngeal smears from which to have cultures made. These have shown that the pneumococcus was the only constant and predominant organism present. The streptococcus, staphylococcus and micrococcus catarrhalis were present in some and absent in others. In four cultures we found pure pneumococcus. The natural difficulty in obtaining laryngeal smears without contamination with the habitant organisms of the pharynx when the applicator is withdrawn, must be apparent to anyone who has tried it. This probably in some measure accounts for the mixed organisms.

These findings and my conclusions are, I think, supported by the large number of pneumococcus infections prevailing at Camp Travis during the winter and spring. We have had in our base hospital, in about four months, 1,139 cases of pneumonia, 600 of pneumococcus conjunctivitis, a large number of pneumococcic middle ear infections, pneumococcic meningitis and pneumococcic tonsillitis, so that finding a localized and independent pneumococcic infection of the larynx merely adds one to our pneumococcus group of diseases.

Symptoms.—The first and practically only symptom in nearly all cases has been aphonia, or hoarseness; 85 per cent have been aphonic when first seen, whether their trouble had been of a few days' standing or of one or more months; the remaining 15 per cent have had hoarseness as the first symptom. The usual assurance of nearly all is, "I have no sore throat." A great many have complained of severe night



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.

- Fig. 1. Ulcerations on the anterior third of the cords.
 Fig. 2. Ulcerations on center of cords as in Laryngeal Syphilitic Plagues.
 Fig. 3. Ulcerations of three months' standing without treatment.
 Fig. 4. Ulcerations, diffuse form, along free border of cords.
 Fig. 5. Paresis of arytenoideus muscle, with aphonia continuing after disappearance of ulcerations.

attacks of paroxysmal coughing and expectoration of a thick tenacious mucus exceedingly hard to loosen.

These cases were considered as simple laryngitis by the regimental surgeons, who expected them to clear up in a few days or in a week or two at the most. As there seemed to be no constitutional involvement, the aphonia, even when prolonged, excited no special notice; many of these cases were of a month or more standing before they reached the clinic. Some of six months' duration are still aphonic.

The appearance of the cords varies with the symptoms present. When there is aphonia, the ulcerations are confined to the anterior half of the cords; they are bilateral, circumscribed, elliptical in shape, and cover the upper surface of the cords and their free borders. When hoarseness is present the ulceration is much more extensive, frequently running from the anterior commissure along the cords to their attachment to the arytenoids. This difference in symptoms is explained, I think, by the fact that when the ulcerations are located anteriorly and are smaller and more circumscribed, the exudate following the infection and ulcerative process is confined in the submucous connective tissue and muscular strata, whereas when the entire free border of the cords is ulcerated, the drainage of the toxic or inflammatory products is more complete, therefore the more extensive ulcerative process gives rise to the milder appearing symptom, hoarseness, instead of aphonia.

Diagnosis.—The laryngeal picture determines the diagnosis; the presence of ulceration distinguishes it from simple laryngitis:

There is much difficulty in differential diagnosis from laryngeal syphilis, which has an almost identical clinical picture. The first case seen was unhesitatingly diagnosed as syphilis, as the elliptical shaped twin plaques were on the center of the cords and presented the typical appearance of the syphilitic laryngeal plaques, first described by French laryngologists. There was a history of syphilitic infection seven years before in this case, but there were no confirmatory lesions in the throat or on the body. Wassermann proved negative. Since then the large number of these cases following in rapid succession, with their distinct characteristics, have

made diagnosis comparatively easy. The absence of the history of syphilitic infection, the absence of any associated syphilitic lesions, and the sudden aphonia and marked predilection of the ulceration for the anterior third of the cords in the majority of the cases are determining or at least influencing factors, and taken with the prevalence of pneumococcic infections are of sufficient weight to determine the diagnosis.

The almost constant selective affinity of tuberculosis for the posterior segment of the larynx should differentiate it from this disease, in which the anterior sector is usually affected, while the arytenoids are free.

After five months' observation of this disease, I find it difficult to divide it, either from the symptoms or its laryngeal picture, into acute, subacute or chronic stages. After it has existed but a few days, it shows on examination a well developed picture of the circumscribed anterior ulcerations or the ulcerations extending along the free border of the cords from the anterior commissure to the arytenoids. The length of time it has existed seems to make in most cases but slight difference in the extent of the ulceration. It does, however, make a great difference in the prognosis. Many of these cases have come to the clinic with a history of two or three months' aphonia without any treatment, and still the ulcerative process would be no more extensive than in those which were of but a few days' duration.

Prognosis.—In the first report to the Surgeon General in February, 1918, I wrote as follows: "After only two months' observation of this disease I cannot treat of it as a possible chronic condition, which I fear it bids fair to develop into, in many cases which come under observation and treatment after the disease is already of a month or more standing."

In cases which came to the ambulatorium in the initial stage the first few days, or even the first two weeks, the ulcerations disappeared after a short course of local applications, and with the disappearance of the ulceration the normal voice returned. In those which were of a month or longer duration before coming under treatment, it required a month or more of local treatment before the ulcerations cleared away. After their disappearance the aphonia remains persistent, and in many cases the cords appear infiltrated, and their free borders are

irregular where tissue destruction has taken place. The prospect of the complete restoration of the normal voice seems questionable.

Out of thirty-five old cases which have been under treatment for two months, the ulcerations in all but five have disappeared, ten have regained their voice, the remainder are still quite aphonic."

After three months' additional observation I shall have to qualify in a measure some of the foregoing observations. After treating these old remaining aphonies for several weeks locally with astringent and stimulating applications without results, I employed stimulation by electric currents with excellent results. All the old aphonias, even those with the worst cords, cleared up with complete restoration to the normal speaking voice, with the exception of a few cases.

These cases of chronic aphonia, if it may be so called, after five or six months' duration, present, with few exceptions, the same laryngeal picture. The mucosa of the cords is congested, as in chronic laryngitis; the cords approximate through their length back to their attachment to the arytenoid cartilages; from this point back to the posterior laryngeal wall there is a triangular space between the arytenoids. This picture shows that the adductors of the larynx are working normally, with the exception of the arytenoideus transversalis, which by its action normally draws the arytenoids together and completes the closure of the glottis. The paralysis or paresis (as you may choose to call it) of this muscle, leaves the triangular space between the arytenoids open, with the resulting aphonia.

Why this one muscle of the vocal group should remain, in some cases, so persistently paretic, is most difficult to understand. It is the muscle most distant from the seat of the original lesion, it is outside of the laryngeal box, situated on the posterior surface of and attached to the arytenoid and cricoid cartilages. I hazard the suggestion that the filaments of the recurrent laryngeal nerve which supply this muscle must pass through, in reaching its final distribution, the area of the original lesion, where either by pressure of exudates or toxic action, it is affected more seriously than the other vocal muscles.

Treatment.—The only local application that has shown favorable results on the laryngeal ulcerations has been nitrate of silver solutions—beginning with a 2 per cent solution for the first week, applied every other day, and then increasing it to 5 per cent, if the ulcerations have not disappeared. In some few particularly stubborn cases, where the ulcerations failed to clear after a month's application of this strength, I have used electric stimulation with the interrupted faradic current. It has restored the muscular activity and voice in nearly all these aphonias. After a few applications given every second day, even the oldest cases' voices began to reappear. It was only a matter of a couple of weeks' use of this means of muscular stimulation before all but a few of these cases had their voices entirely restored.

When hoarseness without aphonia is present I do not advise against the use of the voice. I believe that exercise given the cord muscles is necessary for the preservation of the muscular tone, and that prolonged lack of use is partially responsible for the continued aphonia after the infection has disappeared.

LIII.

THE VALUE OF EAR EXAMINATION TO THE NEUROLOGIST.

BY ISAAC H. JONES, A. M., M. D.,

PHILADELPHIA.

The internal ear has such an intimate relation with the central nervous system that its study is of especial interest to the neurologist. The ear tests are of particular value in making a differential diagnosis between labyrinth and intracranial lesions and in furnishing additional data in intracranial localization.

It is well known that nystagmus and vertigo, with loss of equilibrium, associated perhaps with nausea and vomiting, may be produced either by a disturbance of the internal ear or by an intracranial lesion. In many instances the symptoms of internal ear disturbances and of a cerebellar lesion are identical. It is in such a differentiation that the ear tests are often invaluable. It not rarely happens that a careful neurologic study indicates a lesion of the cerebellum, whereas the ear examination, by giving additional data to the neurologist, demonstrates conclusively that he is dealing with a lesion of the labyrinth.

A differential diagnosis between peripheral and central lesions by means of the ear tests depends on certain general principles. A peripheral lesion, of the labyrinth or eighth nerve, is suggested by the following:

1. An impairment of the function of both the cochlear and kinetostatic labyrinth. If, for example, the hearing tests show cochlear deafness and the tests of the semicircular canals show that their function is also impaired, it immediately becomes probable that we are dealing with an end organ lesion.

2. The history or presence of tinnitus; the absence of tinnitus does not necessarily indicate that the end organ is not involved, but its presence is very suggestive of labyrinth involvement.

3. Proportionate impairment of the responses from the horizontal canal and of the responses from the vertical canals.

If, for example, the tests show that the horizontal canal retains only one-half of its normal function and that the vertical canals similarly retain only one-half of their normal function, a lesion of the end organ itself is suspected.

4. Proportionate impairment of both nystagmus and vertigo. If the horizontal canal produces one-third of the normal nystagmus and one-third of the normal vertigo, it is suggested that the lesion is in the horizontal canal itself or in the fibers from the canal within the eighth nerve; if, in addition, the vertical canals produce one-third of the normal nystagmus and one-third of the normal vertigo, an end organ lesion is strongly suggested.

In a word, it is the "proportionate impairment" of responses that speaks for a peripheral lesion.

A central lesion is suggested by the following:

1. A normal cochlea but impaired or nonresponsive semicircular canals.

2. Normal responses from the horizontal canal but absent responses from the vertical canals.

3. Normal responses from the vertical canals but impaired responses from the horizontal canal.

4. Normal vertigo but impaired nystagmus from the horizontal canal.

5. Normal nystagmus but impaired vertigo from the horizontal canal.

6. Normal vertigo but impaired nystagmus from the vertical canals.

7. Normal nystagmus but impaired vertigo from the vertical canals.

8. Normal vertigo and normal nystagmus from any semicircular canal, but impaired past pointing in any direction of any one extremity.

9. Normal vertigo and normal nystagmus from any semicircular canal but an impairment or absence of the normal falling.

10. Spontaneous vertical nystagmus is pathognomonic of a central lesion and is indicative of involvement of the brain stem caused either by their infiltration or pressure. A lesion of the labyrinth may produce many forms of spontaneous nystagmus—horizontal, rotary, oblique, or a mixed nystagmus of

the various types; but an ear lesion can never produce a spontaneous vertical nystagmus, either upward or downward.

11. If there exists a spontaneous nystagmus to the right and nonresponsive semicircular canals of the right ear, an intracranial lesion is suggested. The nonresponsive labyrinth, if the labyrinth itself alone were responsible, would produce a nystagmus to the left.

12. A spontaneous nystagmus of increasing intensity or of long duration is indicative of a central lesion. A spontaneous nystagmus due to a lesion of the labyrinth shows its greatest intensity at the onset of the disease, becomes less and less marked and disappears after a few days.

13. If a stimulation of any semicircular canal produces a "perverted" or "inverse" nystagmus, it is pathognomonic of a central lesion and is indicative of brain stem involvement. Such phenomena as the following are frequently seen: Douching the right ear with cold water with the head back sixty degrees, stimulating the right horizontal canal, should produce a pure horizontal nystagmus to the left. If on stimulation there occurs a vertical nystagmus upward or downward, a rotary, oblique or mixed nystagmus, it may be spoken of as "perverted." If, instead of a horizontal nystagmus to the left, there is produced a pure horizontal nystagmus to the right, it may be termed an "inverse" nystagmus. Neither a perverted or an inverse nystagmus can possibly be produced by a lesion of the labyrinth or eighth nerve; a peripheral lesion produces a poor nystagmus or no nystagmus at all, but an absolutely false response of necessity demonstrates a central lesion.

14. If ear stimulation produces a conjugate deviation of the eyes instead of a nystagmus, it is pathognomonic of a central lesion.

The above outline indicates how additional data may be furnished to the neurologist by the ear tests in determining whether he is dealing with a lesion of the internal ear or of the brain stem or cerebellum. In the broader field of localization, examination of the ear and of the vestibular apparatus is also of distinct value. The particular feature of the ear examination is that the aurist sends in a stimulus to the

brain centers, and then notes the responses of the different parts of the body to this stimulus. For example, by stimulation of the ear there results a nystagmus in a given direction, a pointing of the extremities to the right or to the left, as the case may be, and a falling to the right, to the left, forward or backward as the case may be. Now, if the ear and these central paths from the ear are intact, all the normal responses will appear. If there is a failure of all or any of the responses it is positive evidence of an interruption along that particular path or paths that fail to bring about these responses.

In order to utilize the knowledge obtained from these tests it is essential to have in mind the various pathways constituting the vestibular apparatus. It has been demonstrated that the pathways from the horizontal semicircular canal are different after entering the brain stem from those of the vertical canals; furthermore, that each set of tracts divides into two separate pathways; one pathway, the vestibuloocular tract, is responsible for the eye movement, and the other pathway, the vestibulo-cerebello-cerebral tract, conveys the impulses from the ear to the cerebral cortex, producing vertigo. If the horizontal canal fails to produce both nystagmus and vertigo the lesion indicated is at a point before the division of the horizontal canal fibers into their two separate pathways. Further, if the horizontal canal produces normal vertigo but no nystagmus, the lesion indicated is in the vestibuloocular tract at a point beyond the point of division into the two paths. If the horizontal canal produces normal nystagmus but no vertigo, the lesion indicated is at a point along the vestibulo-cerebello-cerebral path beyond the point of division into the two pathways. Similarly, if the vertical canals produce normal vertigo but no nystagmus the lesion indicated is in the vestibulo-ocular tract at a point beyond the division into the two paths. If the vertical canals produce normal nystagmus but no vertigo, the lesion indicated is at a point along the vestibulo-cerebello-cerebral path beyond the point of division of the two pathways. The ear tests have proven themselves surprisingly helpful in locating lesions in the cerebellopontine angle, medulla oblongata, pons, cerebellar peduncles, cerebellum and various portions of the cerebrum,

including the parietal lobe, the temporal lobe and the occipital lobe.

In order to obtain reliable data from an ear examination, it is essential that the technic of examination should be accurate and painstaking. Since it is primarily an ear examination, the otologist is peculiarly fitted to carry out such an examination. Although our purpose of this paper is to furnish a practical guide for the otologist in undertaking the examination of patients, it is also offered to the neurologist so that he, on his part, may become familiar with the ear aspects of the work, in order to realize the significance of the reactions as reported to him. The ear examination is obviously not for the purpose of making a neurologic diagnosis; it merely gives additional information by a series of refined experiments, to the other methods at the command of the neurologist. To be sure, there are many cases in which the neurologist, without the aid of the ear, eye, blood, or other examinations, finds no difficulty in arriving at a satisfactory diagnosis. In these cases, however, it is, of course, useful to have the additional evidence from the ear tests corroborating his neurologic and other findings. In addition, it not infrequently happens, in obscure cases, or in cases in which the neurologic data are meager, that the ear tests may be the only means of furnishing information upon which a diagnosis can be made. For example, an apparently strong, vigorous man, complaining only of headache, showed on examination that both internal ears were normal, and yet the vertical semi-circular canals of both ears, when stimulated, failed to produce any responses whatever. The horizontal canals produced normal nystagmus, but no vertigo. As the labyrinths and eighth nerves in this case were unquestionably normal, the nonappearance of the normal responses to stimulation could be accounted for only by an interference with the fibers from the labyrinth within the brain stem. This particular phenomenon complex indicates pressure within the fourth ventricle. This conclusion was recorded with considerable misgiving because a lesion within the fourth ventricle appeared ridiculous, in view of the man's apparent health. That night the patient was rushed to the hospital unconscious. The next day he regained consciousness, but complained of agonizing

headache. Examination by a number of internists and neurologists failed to give any clue of an organic lesion anywhere, and the diagnosis of hysteria was made. Autopsy three days later showed abscess in the fourth ventricle. It is in such cases as this that the ear examination is of the utmost importance, as it gives data absolutely unobtainable by the usual neurologic tests.

Medical Arts Building.

LIV.

TYPES OF MASTOID STRUCTURE WITH SPECIAL REFERENCE TO THEIR DIFFERENTIATION BY MEANS OF STEREORADIOGRAPHY.*

BY F. NOLTON BIGELOW, M. D.,

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The mastoid radiogram, considered at one time a fad of doubtful value, has within the past five years come to be recognized as the otologist's "best consultant." The pioneer work in mastoid radiography, begun in 1907, may be said to have been completed by 1912, for, judging by the literature that appeared during that period, several observers had attained results equal to those of the present day. The reason that the profession as a whole has been so slow to recognize the practical value of X-ray findings undoubtedly is the fact that the mastoid radiogram requires a considerable degree of technical perfection, to be a practical and reliable aid in the diagnosis of mastoid infection. Iglauer² and Lange,³ Birkett⁴ and Pirie⁵ and other pioneers in this field, otologist and radiologist working together, were enabled in large measure to overcome technical difficulties and therefore found the mastoid radiogram to be of considerable value. But so far as the majority of otologists were concerned, useful radiograms were for the most part unobtainable, and the rank and file were compelled to wait till improved technic and apparatus placed this valuable aid at their disposal. During this transition period mastoid radiography was naturally subjected to much adverse criticism, due more to faults in technic than to its inherent limitations.

At the present day a storm of protest would undoubtedly arise should the practical value of this means of investigation

*Presented as a candidate's thesis to the American Laryngological, Rhinological and Otological Society, 1917. Read before the joint meeting of the American Otological and the American Laryngological, Rhinological and Otological Societies at Atlantic City, May 29th, 1918.

be seriously questioned, yet in the discussion of everyday problems of middle ear and mastoid infection the possible value of the mastoid radiogram is still little emphasized. In proof of this statement the following may be cited: In December, 1916, a paper was read before the American Academy of Ophthalmology and Oto-Laryngology in which the author⁶ gave some detailed replies to three questions sent to leading otologists throughout the country. These questions were as follows:

"In an uncomplicated case of acute suppurative otitis media, how long would you treat it conservatively before opening the mastoid antrum? After opening the mastoid antrum, how long would you wait, provided the case showed no signs of improvement, before performing the radical operation? In an uncomplicated case of acute suppurative otitis media, provided you had not had the care of the case during the acute stage, how long would you treat the case conservatively before performing the radical operation?"

It is not unreasonable to assume that in any one of these conditions the mastoid radiogram might be the deciding factor, either for or against operation; yet in the nineteen replies to these questions, the possible significance of X-ray findings is mentioned but once, and in the discussion that followed the reading of the paper three times, in two instances by men who had not mentioned the same in their replies. Out of twenty-five otologists, who expressed opinions in one way or another, there were four who mentioned the possible value of radiography.

It is also noteworthy that as regards question one, early mastoid operation which, under the conditions stated means exploratory operation, was advocated by three men who did not mention X-ray examination. If radiography has any diagnostic value whatever, it is in determining what is going on inside a mastoid previous to operation. Therefore instead of the slogan, "When in doubt, operate," why not this variation, "When in doubt, radiograph; if still in doubt, operate"?

As stated before, the above discussion gives the opinions of twenty-five otologists regarding three everyday problems of middle ear infection. When taken as a whole, these opinions emphasize the significance of pathology and mention in

detail the means for determining the same; yet in no instance is either the clinical or the surgical significance of mastoid structure even mentioned.

Mastoids differ one from the other as do buildings, which vary in size, thickness of walls and partitions, number, size and arrangement of rooms. Can we imagine a body of engineers attempting to solve the problems of strain and stress that occur in buildings, without taking into account variations in structure? Are we as otologists any more justified in attempting to determine the behavior of mastoids under the strain and stress of infection without also taking into account variations in anatomic structure?

Papers ⁷ ⁸ on the clinical significance of mastoid structure have appeared from time to time, and every man who does mastoid operations not only learns that mastoid structure varies, but often discovers at operation how some unsuspected peculiarity of structure has masked or otherwise influenced the clinical picture. Referring again to question one for a concrete illustration, "an uncomplicated case of acute suppurative otitis media," in other words, an otorrhea without other signs or symptoms: the mastoid in this case might either be large with many large pneumatic cells widely distributed, or it might be small with practically no cell structure whatever. Would not definite knowledge on this point enable the observer to predict the clinical course and probable outcome of this case with greater exactness, and would not his therapeutic measures be based more on scientific principles and less on empiricism?

Before the advent of mastoid radiography, there was no means by which the structure of a mastoid could be accurately determined previous to operation; consequently, mastoid structure received little or no consideration as a clinical factor; for while it is true that the size and shape of the mastoid may give some clue as to the underlying anatomy, yet experience has proven that for the most part this is but the merest guesswork. To determine previous to operation the size, distribution and approximate number of the mastoid cells and the location of the sinus, the radiogram is the *sine qua non*. While this fact has been mentioned in practically every paper on mastoid radiography, yet, for the most part,

these investigations have been devoted more to mastoid pathology than to mastoid structure.

The classification of mastoids into three types, according to cell structure, the pneumatic or air containing, and the diploetic or nonair containing, and the mixed, is the one generally used. To make this classification useful for clinical study and comparison, it must be made more descriptive and sufficiently comprehensive to include such other variable factors of mastoid structure as have clinical significance, among which are the thickness and density of cortex and cell partitions, the number, distribution and arrangement of cells and the location of the sinus. Both the diploetic and the pneumatic mastoid can be divided into three distinct anatomic types, each having both clinical and surgical significance peculiar to itself.

Cheatle^{9 10 11 12 13} has made an exhaustive anatomic study of mastoid structure, and his description of the diploetic types is so clear and concise that to attempt to summarize the same would do his work an injustice. Therefore these types, with such additions and references to actual cases as seem pertinent, will be described in Mr. Cheatle's own words,¹¹ which are as follows:

"I apply the term 'infantile' to those bones which retain throughout life the characteristics of the outer antral wall and the mastoid mass as seen in infancy (Figure 1). On making a lateral vertical section through the antrum and the mastoid mass in infancy, it will be seen that the outer wall of the antrum is composed of two layers—a thin outer layer of compact bone, and an inner layer of fine cells. These cells are formed before birth; therefore I call them the 'fetal cells' to distinguish them from any which may form in later life, and from which they can be differentiated always by their fineness and inward direction. The mastoid mass is as a rule diploetic, but it may be formed of dense bone (Fig. 2). If the mass is diploetic, a thin layer of compact bone, which can be easily demonstrated by scraping away the diploe, separates it from the antral cavity. There are therefore two types in infancy: one in which the mastoid mass is diploetic and one in which the mastoid mass is dense. Each type may persist all through life, but of course on an exaggerated scale."

Type 1.—“The diploetic type in the adult. In this type the thin outer compact layer of the antral wall has increased in thickness from the periosteal side and is of extreme density; the inner layer of ‘fetal cells’ is still seen; the mastoid mass is entirely diploetic, and the separating layer between the diploe and the cavity of the antrum is much increased in thickness (Figure 3). Whenever the mastoid process is entirely diploetic the outer antral wall is always formed of dense bone. This type is seen in about twenty per cent of all bones, and it can be seen at all ages.

Type 2.—“The dense form in the adult. In this type the dense mastoid mass persists all through life, but the outer antral wall remains the same as in the diploetic type, the outer layer being very much increased in thickness and of extreme density, while the inner layer of ‘fetal cells’ is still seen (Figure 4). This form is only seen in about one or two per cent of all bones.” In the writer’s experience, the cortical surface of mastoids of this type often has a warped appearance due to a deep irregularly triangular depression or wrinkle at the upper posterior border of the mastoid. (Case 2, 3.)

Continuing Mr. Cheate’s description: “The outer antral wall is often of great thickness as well as density in these infantile types. The greatest depth of antrum from the surface is seen in them; it may measure three-quarters of an inch (nineteen millimeters). A forward lateral sinus is usual and is found much more frequently and to a much greater extent than in the cellular types. The sinus often comes well forward below the level of the antrum, and may reach the posterior meatal wall, or it may even dip in between the cavity of the antrum and the surface (Case 1, Figure 5). The antrum may be large or small; if large, the posterior wall may be of extreme thinness and translucency, and may have the cerebellum or lateral sinus, or both, lying against it. In some specimens the posterior antral wall is pushed in by the cerebellum, thus narrowing the antral cavity from before backwards. As in all types, the antrum may be highly placed, or the middle fossa may dip down between either the antral cavity and the surface or external to the superior semicircular canal, causing a low flat antrum.”

From this description, the operative difficulties that these

types present are too obvious to require but passing mention. The antrum may be extremely difficult to find, and in the necessary search the sinus, the dura of either the posterior or the middle fossæ, and the facial nerve are all liable to injury.

As regards the clinical significance of these types, Mr. Cheatele says the following: "It is obvious that an acute suppuration in the antrum may exist without any signs behind the ear, as it is impossible for pus to penetrate the outer antral wall or reach the mastoid process, and that there is a great liability for further serious extension, especially to the posterior fossa, if the posterior antral wall is very thin. If intracranial or labyrinthine infection does not occur in acute suppuration there is great chance for the suppuration becoming chronic; the lining membrane of the antrum undergoes destruction and degeneration, or some local destruction of part of the bony walls or ossicles takes place and causes a chronic discharge from the middle ear tract. There is no doubt that the infantile types are found most frequently when operating for chronic suppuration."

This concisely summarizes the possibilities inherent in the "infantile" types of mastoid structure. An acute middle ear and antrum infection, occurring in these types, is likely to run a long subacute course with little or no objective evidence of mastoid involvement. Apart from otorrhea, drooping of the posterior superior canal wall may be the only clinical sign to indicate the necessity for operation (Case 2). As type 2, except in the "outer antral wall," has no cell structure that can be infected, mastoid tenderness and edema is even less likely to occur than in type 1 (Cases 2, 3). Although it be impossible for pus to extend directly from the antrum into the diploetic cells of the mastoid process in type 1, yet experience shows that infection of these cells does occur, probably through the blood and lymph channels. This infected cellular structure is often quite hard, with a more or less gritty feel, and when, as frequently happens, it blends with the diploe of the surrounding bones, the complete extermination of infected cells is a difficult task (Case 5). The typical signs and symptoms of mastoiditis may all be present in this type and continue indefinitely, with periods of im-

provement followed by relapses, but at no time being as threatening as in the pneumatic types to be described later (Case 5, Figure 6).

Cases are seen occasionally in which there is exquisite tenderness over the mastoid, with or without thickening of the overlying soft tissues, but without any history of otorrhea or any other objective evidence of middle ear or mastoid infection, and if the mastoid be explored, no infection will be found to account for these symptoms. In the writer's experience such cases usually have the infantile type of mastoid structure (Cases 6, 7, Figure 7).

From the anatomic studies above quoted, it seems reasonable to assume that either the diploetic or the dense type of "mastoid mass" is the one present at birth, pneumatic cells being formed by projections of the antral mucous membrane eroding their way into this primary mass or mastoid process. Stewart,¹⁴ by the radiographic study of mastoids in children, has demonstrated that this process begins at an earlier age and proceeds with greater rapidity than had previously been supposed.

As Cheate's work demonstrates that in twenty per cent of all bones no pneumatic cells are to be found, or, as he would express it, these cases retain the infantile type of structure throughout life, it seems probable that in a certain percentage of all bones the pneumatic structure may be very rudimentary (Figure 8, 9). Both the surgical experience of the writer and the examination of numerous radiograms lead him to conclude that this supposition is correct and that adult mastoids of essentially infantile type do occur in which there is also a rudimentary pneumatic structure represented by a group of three or four large cells at the tip or some other locality. These mastoids have both clinical and surgical significance sufficient to warrant their classification as a distinct type.

Type 3.—The mixed infantile and pneumatic mastoid with the infantile characteristics predominating. Mr. Cheate apparently refers to this type of structure in the following words: "I wish to say that a dense outer antral wall does not always mean that cells (pneumatic?) are not present in the mastoid. For the outer antral wall may retain this infantile

form, and a few cells may be present along the squamo-mastoid suture (Figure 8), thus closely resembling the pure infantile type; or a narrow tract may pass through the upper mastoid to large cells in the lower or projecting part of the process (Figure 8). A rare condition is for a dense outer antral wall to be associated with a narrow, tortuous tract of cells with very dense walls running through the mastoid. I may say that if cells, apart from the 'fetal cell,' are present in the outer antral wall, they are also present to a greater or less degree in the mastoid."

From the above description it is evident that various combinations are possible. The cell structure of Case 8 possessed most of the dangers inherent in both the diploetic and the pneumatic celled mastoid, with none of the safeguards of the latter type. This case was a type 2 or dense infantile mastoid with an isolated group of large cells imbedded in dense bone over the lateral sinus. Although in one of these cells the infection had eroded the bony covering of the sinus, yet there was no clinical evidence of this fact, the external cell walls being so dense that infection had but one direction in which to travel, namely, inward. Had it not been for the stereoradiogram, these cells would unquestionably have been overlooked at the operation, with possible disastrous results easily to be imagined.

Case 3 (Figure 10 a, b) demonstrates that the same individual may have a dense infantile mastoid on one side and a pneumatic celled mastoid on the other: a point also demonstrated anatomically by Mr. Cheate.¹³

Cheate protests against the term "sclerosed mastoid," as applied to the infantile types. Sclerosis means a hardening due to some inflammatory process; in other words, it is an active process akin to scar tissue formation. While it seems probable that under certain conditions sclerosis does occur in these types (Case 4), yet when the term "sclerosed" is applied indiscriminately to every small mastoid with a thick dense cortex and a fine dense cellular structure, it is evidently a misnomer.

In case 4 (Figure 11 a, b) the normal mastoid shows in the radiogram a well marked pneumatic structure. In the diseased mastoid, there was found at operation a chronically in-

fectured antrum of moderate size deeply situated in dense bone that contained no cell structure. As no microscopic sections of the bone were made, it is of course impossible to tell whether the density of bone was due to sclerosis from chronic infection or to persistence of infantile type, or both.

In the X-ray examination of the infantile types the inherent limitations of radiography must be considered. As the radiogram is merely a record of densities, it must always be borne in mind that the dense outer wall of the mastoid tends to obscure the small underlying cells. Where many cells are superimposed, they will show in the radiogram, otherwise they may not be apparent. It is therefore evident that the radiogram cannot be expected to show the exact details of cell distribution, although it will in most instances furnish a valuable clue as to the type of structure.

The radiogram, especially when a stereoscopic study is made, will practically always show the sinus to be far forward in the infantile types. When to this appearance is added a suggestion of cell structure towards the tip of the mastoid and a cellular area just above and behind the middle ear, the remainder of the mastoid appearing dense, in the writer's experience, type 1 is to be confidently expected (Figure 3, 6). When the entire mastoid appears dense, with the exception of a small cellular area, often but a faint suggestion, just above and behind the middle ear, type 2 is to be expected (Figures 4, 5, 7, 11b). When to one or the other of the above findings there is added a small group of large cells, though they be but faintly outlined, type 3 is to be looked for, and at operation the locality in which large cells are suspected should be thoroughly explored (Figure 8).

The pneumatic mastoid can also be divided into three distinct types, the word pneumatic indicating a common characteristic, namely, that the cell structure is essentially air containing.

Type 1.—The pure pneumatic type, practically all of the cell structure containing air. The usual structure of this type is as follows: The whole mastoid, including the tip, is large and well developed; the cortex is relatively thin; most of the cells are large in size with thin partitions, and are uniformly distributed throughout the mastoid (Figure 12). These features

are by no means constant, for occasionally the cortex may be of considerable thickness and density; instead of being limited to the mastoid, the cell structure may invade the occipital bone or the zygoma (Figures 13, 14 a, b); while a large tip is the rule, yet a mastoid with little or no tip development may be entirely pneumatic. As in all types, the sinus is variable, although it is usually found well back and deeply situated.

It is a well known fact that mastoiditis with an abrupt onset of stormy and threatening symptoms, which may as promptly subside under treatment, is a common occurrence in large pneumatic mastoids. In contradistinction to the infantile types, a middle ear or antrum infection can, in this type of mastoid, extend directly into the mastoid cells. On the additional fact that the cells contain air can be based a physical theory to explain the clinical course of mastoiditis in the pneumatic types. As the air in all pneumatic or air containing structures is maintained at atmospheric pressure by a more or less direct communication with the surrounding atmosphere, whenever this communication is interrupted for any length of time, the contained air is absorbed and a partial vacuum with consequent negative pressure results. In an acute suppurative otitis media, the infection, first of all, occludes the eustachian tube, with resulting absorption of air and vacuum formation in the middle ear and mastoid cells. This in turn causes venous engorgement with consequent swelling of mucous linings and outpouring of serum, the objective evidence that "nature abhors a vacuum." A fallow field is thereby prepared for the growth of bacteria, and the infection spreads apace. This is shown clinically by the rapid onset of pain, mastoid tenderness and occasionally edema. Pain and tenderness may be present before there is any objective evidence of infection in the middle ear (Case 10, Figure 20 a, b). It seems reasonable to assume that incision of the drum membrane not only provides drainage for the mastoid but also tends to restore atmospheric pressure and abolish negative pressure in the mastoid cells, this of itself tending to reduce the edema and swelling of the mucous membranes and the general venous engorgement. The ground, so to speak, is thereby knocked from under the infection, and unless the general resistance is too low or the infection too

virulent or too much damage has already resulted, the stormy and threatening symptoms promptly subside and the case recovers, often with surprising rapidity. (Case 9), (Figure 14 a, b). When resolution does not take place, clinical signs and symptoms will usually furnish ample evidence of this fact.

However, experience shows that considerable destruction of cell structure can occur without clinical signs or symptoms, or these signs and symptoms may make their appearance late in the course of the infection. There are two structural possibilities to explain these occurrences. The cell walls may be so thin and fragile that destruction of cell structure causes little or no local reaction, or the signs and symptoms of mastoiditis may be obscured by an unusual thickness and density of cortex (Cases 11, 12).

Cells may extend so deeply into the occipital bone or into the zygoma that, without foreknowledge of their presence, they may be overlooked at operation and failure of healing or intracranial complications result. Figures 13, 14 a, b show how closely zygomatic cells may approach the temporomandibular articulation. Mastoid infection under these conditions could easily invade the joint cavity.

The type 1 pneumatic mastoid is the easiest and most satisfactory of all types to radiograph, for unless the cell structure has been entirely destroyed, the radiogram will demonstrate the exact details of cell distribution and of pathology as well. As pathologic appearances have been well described by previous observers, they will be given but passing mention. An early stage of mastoid infection is indicated in the radiogram by a general haziness and a blurring of cell outlines, with here and there an apparent breaking down of individual cell partitions (Fig. 14 b). Cases with this X-ray appearance may or may not resolve. When resolution does not take place, a later plate will show more disintegration of cell partitions and considerable cloudiness with only occasional fragments of cell outline. Unless the radiogram is of the highest technical quality and the observer not only has a thorough knowledge of mastoid radiograms but also makes a careful study of each individual plate, this latter appearance may be confused with the X-ray appearance of the infantile types

or vice versa, and an entirely wrong interpretation result (Case 3), (Figure 10a, b).

Type 2.—The mixed pneumatic and infantile mastoid with the pneumatic characteristics predominating. From the clinical point of view, the distinctive characteristics of this type would seem to be the presence of sufficient pneumatic structure for negative pressure to play a part in the spread of infection. It is, of course, obvious that in some cases this type cannot always be distinguished by the radiogram from the type 3 infantile mastoid, on the one hand, and the type 1 pneumatic mastoid on the other. Figure 15 shows a cross sectioned temporal bone, whose cell structure is largely pneumatic. In the tip directly under the cortex is a nest of large diploetic cells separated from the pneumatic structures by a layer of compact bone. Figure 16 shows this cell nest as revealed by the radiogram. When viewed stereoscopically its separation from the pneumatic structure is quite apparent. Mr. Cheatele has demonstrated that at birth the diploetic or "fetal" cells of the "mastoid mass" are separated from the antrum by a layer of compact bone (Figure 1). In the above specimen, the pneumatic cells, in their development from the antral mucous membrane, instead of penetrating this original layer of compact bone, have apparently pushed both it and the underlying diploetic cells into the tip.

Although an acute infection occurring in this mastoid would undoubtedly run the same clinical course as in the type 1 pneumatic mastoid, its surgical importance would be greatly increased by the nest of diploetic cells separated by dense bone from the pneumatic structure. Though infection of this cell nest by direct extension and negative pressure be impossible, infection through the blood and lymph channels would be not only possible but probable, and unless infection had eroded the bony partition or the tip were removed at operation, this cell nest might easily escape notice and remain undrained, a possibility at variance with the often expressed opinion that even though all of the cells are not removed at operation, those that remain will have adequate drainage.

Although some photographs¹³ of Mr. Cheatele's specimens apparently show a layer of compact bone separating diploetic from pneumatic cells, no general conclusions can be drawn

from the limited material at hand. Whether or not diploetic and pneumatic cell structure is often or always separated in this manner, is a question that cannot be answered without further investigation. As a practical measure it would seem prudent to thoroughly explore at operation every area in which the radiogram revealed the presence of diploetic cells. For this purpose the stereoradiogram is the only reliable guide, as many large cells superimposed may in the single plate simulate diploetic structure (Figure 17 a, b).

Type 3.—The "double decked" mastoid. This term is used at the Massachusetts Charitable Eye and Ear Infirmary to describe those mastoids in which the cells are arranged in two tiers separated one from the other by a bony septum which in location and general appearance often closely resembles the internal table. Case 13 is a remarkable demonstration of the surgical importance of this type.

The writer performed a left mastoid operation about five years ago on a man aged sixty-nine years, referred by Dr. R. S. Phillips, in which this type of structure was well marked. In this case, signs and symptoms of mastoiditis sufficient to warrant operation were slow to appear, and as satisfactory radiograms of the mastoid were then unobtainable none were taken. At operation removal of a very thick dense cortex disclosed a considerable amount of large necrotic cells filled with pus and granulations, the removal of which left a cavity of average size and depth. On investigation of what appeared to be the internal table there was found some areas of softening leading into cells underneath, removal of this false inner table revealing another tier of necrotic cells, which when curetted out left a cavity of unusual depth.

Figure 18 is a radiogram of the normal mastoid in this case, taken recently by Dr. Gerber. The single plates apparently show a mixed diploetic and pneumatic structure which, when viewed stereoscopically, appears to be arranged in two separate tiers one over the other. The outer tier, composed of large pneumatic cells, begins at the cortex and apparently occupies the larger part of the mastoid process, while the inner tier, composed of small diploetic cells, extends deeply into the posterior part of the pyramid. No bony septum can be made out, although one might be present and yet not ap-

pear in the radiogram. As the left mastoid had the typical double decked arrangement of cells, it is quite likely that the same arrangement is present in the right. It is, therefore, possible that this type of mastoid may have the same development as was suggested in reference to the nest of diploetic cells in Figures 15 and 16.

As previously pointed out, in the bone from which these figures are taken, the "fetal" diploetic structure and the layer of compact bone separating it from the antrum has apparently been forced into the tip by the development of the pneumatic cells. Had these cells in their development proceeded directly to the cortex and then down into the tip without penetrating the "fetal" layer of compact bone, the diploetic cells would then have been found in the depth of the mastoid, separated from the overlying pneumatic structure by a layer of compact bone; or had the reverse taken place—that is, had the pneumatic cells occupied the depth of the mastoid and forced the diploetic structure underenath the cortex, we would have, in either event, the "double decked" mastoid. Much more investigation is, of course, necessary to determine if this be the correct explanation for the occurrence of this type.

In all probability this type of structure can never be conclusively demonstrated by radiography. Yet whenever the stereoradiogram reveals both diploetic and pneumatic cells apparently segregated, with one type of cell structure overlying the other (best seen by reversing the plates),¹⁵ the possibility of the "double decked" mastoid should be borne in mind.

As reference has been made from time to time to the necessity of securing radiograms of good technical quality, it seems well to state briefly just what this term implies. The writer has therefore asked Dr. Isaac Gerber, to whose skill and co-operation he is greatly indebted, to state in a general way how a thorough X-ray examination of the mastoid is made and how the quality of a plate is determined.

"In the radiographic study of the mastoid, plates are generally taken in two projections, the anteroposterior and the lateral oblique. The anteroposterior projection sometimes is made so that both mastoids are taken at one exposure. As modified by Hickey, however, each mastoid is exposed separately on one-half of a plate with the same technic, and with

a very small cone, so that the greatest possible definition is obtained. While the evidence from this projection is limited, still it is important as a supplement to that obtained by the other exposures. A general idea is had of the depth of each mastoid, of the gross distribution of cells and diploe, and of the rough air content of each side. The finer details of mastoid structure and topography can only be seen on the lateral oblique plates. These are taken with the central ray passing through the vertex of the skull at such an angle as to project only underneath the mastoid onto the plate. The usual custom has been to expose each mastoid in this way, often on separate halves of a single plate. If the exposures are made with the same technic, a good opportunity is afforded to compare the details of the two mastoids, side by side.

With single flat plates of this sort, however, the information is much limited. If one side is normal, the study of the diseased side is facilitated; otherwise it is difficult. The contrast between air content on one side and haziness on the other can easily be noted. Destruction or thickening of the cell walls can often be seen. But the finer details of mastoid structure, such as the exact distribution of pneumatic cells and diploe, the exact relations of the sinus, the presence of partly sclerosed cells, etc., all of which are of the utmost clinical importance, can only be obtained accurately by the study of stereoscopic plates of each mastoid. Many points which are doubtful from a study of the flat plate are cleared up with certainty by the stereoscopic study. In short, the advantages of stereoscopic study of the mastoid are those which accrue to stereoradiography in general, and which have caused the marked increase in the use of stereoscopic rather than flat plates wherever practicable.

An estimation of the technical quality of plates of the mastoid region is of extreme importance. When some or all of the mastoid cells are pneumatic, the character of the cell detail will furnish an index of plate quality. In a good plate the normal cells should be definitely black, with sharp and clean cut walls. If there is any generalized disease process, other portions of the plate must be considered in judging quality. The temporomandibular joint, the auditory canal, and the lateral sinus are all regions that must be studied.

They should be sharp and clear cut in a properly exposed and developed plate. The bone of the mandible should show its structure well defined. In addition, the character of the detail of the skull generally and of the sutures is of value. The ability to judge these points is of especial importance when examining stereoscopic plates, as we then have at least four plates developed separately. The use of the Coolidge tube is an aid in obtaining uniform exposures. A complete X-ray examination of the mastoid therefore consists of a stereoscopic set of plates of each mastoid in the lateral oblique diameter, and one exposure of each mastoid in the antero-posterior diameter."

The writer would add, in conclusion, that an X-ray examination of this character and quality will in most instances reveal the type of mastoid, and that this information, irrespective of what pathology may be revealed, should enable the observer to predict the clinical course and the prognosis of a middle ear infection with greater exactness, and place therapeutic measures on a more scientific and less empirical basis. For example, if the X-ray examination shows the mastoid to be one of the infantile types, the observer is thereby informed that in the case under consideration mastoid symptoms may not appear or may be very indefinite, and that the middle ear infection is quite likely to become chronic. Forewarned by this knowledge, he should prevent such a contingency by early drainage of the antrum, regardless of the absence of the classical indications for the performance of this operation. If, on the other hand, the radiogram shows the mastoid to be one of the pneumatic types, the observer should not hasten the patient to the operating table at the onset of stormy and threatening mastoid symptoms, but should remember Schwartze's dictum that, barring unusual symptoms, acute mastoids do not require operation unless the stormy mastoid symptoms continue unabated longer than eight days after incision of the drum membrane; in other words, he should wait a sufficient length of time for the re-establishment of atmospheric pressure within the mastoid cells.

As to the objection to routine X-ray examination, on the ground of expense to the patient, if the otologist is fully con-

vinced in his own mind of its usefulness and necessity, he should have little difficulty in convincing the patient, especially as the average individual has an exaggerated idea of what may be learned from a radiogram and has, besides, a greater dread of a mastoid operation than of almost any other surgical procedure. X-ray examination is not necessarily unavailable for very sick patients in private houses, as Case 12 demonstrates.

The following cases, which have been referred to from time to time, have been selected to illustrate the clinical and surgical significance of different types of mastoid structure, with special reference to their determination by means of the mastoid radiogram.

Case 1.—A forward and unusually superficial sinus, occurring in an infantile mastoid (probably type 2).

Hospital patient, a young woman, aged nineteen years; admitted to the Rhode Island Hospital, October 28, 1917, for a purulent discharge from the right ear, of three years' duration. The stereoradiogram showed what appeared to be an infected type 2 infantile mastoid, with the sinus far forward, the usual location in this type. At operation retraction of the soft tissues revealed a bluish spot about half the size of a dime, at the posterior border of the suprameatal triangle. As this spot gave the appearance of necrotic bone, it was investigated with the bone searcher, which to the writer's chagrin plunged through a delicate film of bone into the sinus, the ensuing hemorrhage necessitating a "strategic retreat." The initial incision was close to the auricle, otherwise the sinus would in all probability have been opened with the first cut of the scalpel. On again looking at the stereoradiogram, the sinus was seen to show with unusual distinctness, due, of course, to the thinness of the bony covering (Figure 5).

Case 2.—An acute middle ear and mastoid infection occurring in a type 2 infantile mastoid.

Private patient, a young man, aged nineteen years, referred by Dr. Halsey DeWolf, April 1, 1915. This case ran a sub-acute course for a month before it was finally operated. When first seen, patient had had pain in the right ear for twenty-four hours. There were two or three blebs on the drum membrane, but no general redness or bulging. These blebs were

incised, and although the pain did not recur, yet as the drum membrane without definite bulging gradually became red and thickened and a slight serous otorrhea persisted, the drum was incised a few days later. After a week the otorrhea, which remained serous, had nearly ceased, when the pain suddenly recurred, accompanied by distinct bulging of the drum membrane. The incision this time was followed by a moderate mucopurulent otorrhea that neither increased nor diminished. After about ten days some drooping of the posterior superior canal wall developed, this and the persistent otorrhea being the only clinical evidence of mastoid infection. A radiogram taken by Dr. Gerber showed an infected type 2 infantile mastoid, these findings being confirmed at operation.

The cortical surface of this mastoid had a warped appearance, due to an irregular triangular depression or wrinkle about an inch directly back of the suprameatal spine. The cellular structure consisted of a few scattered cells directly under the suprameatal triangle, the rest of the mastoid being entirely dense. The sinus was far forward and was exposed in the search for the antrum, which was very small. The middle ear was entirely dry within a week after the operation, and the hearing which had been much affected promptly returned to normal. It is this type of mastoid, one of the typical infantile types, that is often termed atypical, or sclerosed.

Case 3.—An infected type 2 infantile mastoid on the right and a large normal pneumatic mastoid on the left side.

Private patient, a young man, referred by Dr. James Gilbert, May 27, 1916. Five months previously patient had an attack of "la grippe," at which time an otorrhea developed in the right ear and continued till five weeks ago, when it suddenly ceased. One week ago a swelling suddenly developed in the right side of the neck, just below and back of the ear. The drum membrane was found to be dark red in color and much thickened, but without bulging or perforation. Low conversational voice was heard at two feet. There was a hard non-fluctuating swelling the size of a tangerine just below the mastoid and under the sternomastoid muscle. A radiogram was taken by Dr. Gerber, which was misinterpreted by both he and the writer. As a large pneumatic mastoid was appar-

ent on the left side, this fact together with the clinical history and examination led us to interpret the appearance of the right side as a large broken down mastoid probably filled with pus and granulations (Figure 10 a, b). Patient insisted on delaying operation for a week, during which time the swelling in the neck entirely disappeared.

At operation the warped appearance of the cortex, as described in Case 2, gave warning of a forward sinus, the first chip of bone removed exposing the same. The cellular distribution was exactly the same as in Case 2. Although there was no pus, the sinus was found to be covered with granulations for about two-thirds of an inch. The mastoid wound was entirely healed within ten days, and the drum membrane, which had been incised at operation within two days, the hearing promptly returned to normal. Further study of the radiograms convinced us that had we not been overinfluenced by the clinical history the apparent Bezold abscess and the radiogram of the left mastoid, we would not have misinterpreted the findings (Fig. 10 a, b).

Case 4.—A chronically infected antrum deeply situated in dense bone on the right, a normal pneumatic mastoid on the left side.

Hospital patient, a young lady, aged twenty-six years; admitted to the Rhode Island Hospital April 19, 1917. The right ear had discharged continuously for fifteen years. Three weeks before admission patient had an increase in otorrhea accompanied by pain and mastoid tenderness as a result of an attack of "la grippe," and one week before admission began to have attacks of vertigo, nausea and vomiting, the labyrinth tests indicating that these symptoms were due to pressure and not to labyrinthine infection or fistula. Examination further disclosed a profuse foul otorrhea, a middle ear filled with tough granulations, drooping of the posterior superior canal wall and tenderness over the antrum but no mastoid edema. The radiogram showed a large pneumatic mastoid on the left side, while the right mastoid appeared entirely dense except for a light area the size of a dime just above and behind the middle ear (Figure 11 a, b).

At operation (radical) a large antrum corresponding to the light area was found deeply placed in dense bone that con-

tained no cellular structure, the antrum, attic and middle ear being filled with tough and adherent granulations. No bone was examined microscopically, so it is impossible to tell if the density of bone was due to sclerosis or to persistence of infantile structure or both.

Case 5.—A middle ear and mastoid infection of nine months' duration in a type 1 infantile mastoid.

Hospital patient, a girl, aged fourteen years; admitted to the Rhode Island Hospital October 12, 1917. Mother died of tuberculosis and patient was treated at a camp two years previously for "tuberculosis of the throat," although there are no active signs at present. For the past nine months has had more or less pain in the left ear and a continuous otorrhea. Examination showed a fairly profuse, somewhat foul purulent discharge coming from a large perforation in the anterior inferior quadrant, some drooping of the posterior superior canal wall and well marked tenderness over the entire mastoid. The stereoradiogram showed probable infection of a type 1 infantile mastoid (Figure 6). The symptoms began to subside the day after admission, and at the end of ten days the middle ear was entirely dry, and the mastoid tenderness and drooping of the canal wall had disappeared. Patient was discharged from the hospital and returned five days later with conditions the same as on first admission, pain and otorrhea having recurred the day after leaving the hospital.

At operation the removal of a thick dense cortex disclosed a small diploetic celled mastoid. As the antrum was approached this cellular structure ceased and hard dense bone was encountered. All of the cell structure was hard and resistant and merged posteriorly with the diploe of the occipital bone; the cells in the body of the mastoid and tip were filled with dark red serum but contained no granulations. As there was some bare bone at the entrance of the eustachian tube this case may come to radical operation. At the present writing the middle ear is dry and the mastoid wound healed.

Case 6.—Pain and mastoid tenderness without any other signs of infection, occurring in an infantile mastoid.

Private patient, a young woman, aged seventeen years; seen in consultation with Dr. C. J. Astle. Two years previously had had an otorrhea in both ears, lasting about six

weeks. For the past ten days has had severe pain and tenderness over the left mastoid, with no other signs of middle ear or mastoid infection. A radiogram of the left mastoid was reported as showing evidence of infection sufficient to warrant operation, while that of the right mastoid was said to be too poor a plate to show anything definite. Other radiograms taken a few days later by Dr. Gerber showed two infantile mastoids, both of which were apparently normal (Figure 7). Patient was assured that operation was not only unnecessary but would not even be considered. The pain and tenderness disappeared a few days later. This case shows the danger of basing definite conclusions of X-ray appearances unless both plates be of good quality.

Case 7.—Pain, mastoid tenderness and edema, occurring in an uninfected type 1 infantile mastoid.

Hospital patient, a young woman, aged twenty-one years; admitted to the Rhode Island Hospital. Case reported by the courtesy of Drs. L. B. Porter and H. P. Abbott. This patient had complained of severe pain and tenderness back of left ear for over a week. Examination showed an area of swelling, redness and tenderness beginning about three-fourths of an inch behind the left postauricular fold and extending about the same distance backwards and over an inch downward. There was no tenderness over the antrum or tip, or any other evidence of middle ear or mastoid infection. The radiogram showed what appeared to be a normal type 1 infantile mastoid. Because of the persistence of the pain and tenderness, an exploratory mastoid operation was performed, removal of a thick dense cortex disclosing uninfected diploetic cells throughout the mastoid. The wound was closed without drainage. Pain and tenderness were nearly gone at the end of a week, when the wound became infected and had to be drained. As the wound did very poorly, a stereoradiogram was taken three weeks later that revealed infected diploetic cells in the floor of the cavity overlying the sinus, this X-ray appearance being confirmed at the second operation (Figure 20). At the present writing this case is making a slow but uneventful recovery. This case shows that an exploratory mastoid operation may be attended by bad results, and that a mastoid radiogram, preferably a stereo-

radiogram, is indicated whenever a mastoid wound does not heal readily.

Case 8.—A middle ear and mastoid infection, occurring in a type 3 infantile mastoid.

Hospital patient, a man aged sixty-seven years; admitted to the Rhode Island Hospital August 11, 1917. Hospital record before coming under the writer's observation, reported by courtesy of Dr. L. B. Porter. About two months ago patient developed bilateral deafness over night. For two days had pounding like piston rods in both ears, when both began to discharge a thin whitish fluid, this discharge stopping spontaneously within two days. Since then the right ear has been practically normal, but the left ear has remained very deaf. About three weeks later, patient began to have pain and swelling back of the left ear, both of which have persisted, the pain during the past ten days being so severe as to allow but little sleep. Examination of the left ear showed a drooping of the posterior superior canal, wall so marked that the drum membrane could not be seen, and a large, red, fluctuating swelling over the mastoid, incision of which evacuated a large amount of pus. The radiogram taken later showed probable infection of the left mastoid but no definite details (Figure 8).

Patient remained in the hospital for some time, but refusing operation was discharged to the outpatient department, from where he was readmitted, coming under the writer's care about two months after first admission. At this time examination of the left ear showed a somewhat thickened drum membrane and some drooping of the posterior superior canal wall and a small sinus just back of the auricle, discharging a small amount of pus. Bare bone could be felt at the bottom of this sinus. The stereoradiogram was of such poor quality that the consulting radiologist, Dr. Gerber, declined to give any opinion. While nothing definite could be made out in the single plates, yet when placed in the stereoscope the writer thought he could distinguish a group of large cells some distance directly posterior and a little above the upper margin of the middle ear.

At operation a perforation of the cortex leading into the antrum was found in the suprameatal triangle, together with

a small amount of diploetic structure, the mastoid process below being entirely dense. On exploring the region in which the large cells were suspected four large cells filled with granulations were found nearly two inches posterior and a little above the suprameatal spine deeply imbedded in dense bone, no cell having and apparent connection with any other cell (Figure 8). The deepest and most posterior cell, about the size and shape of a white bean, was situated over the sinus apparently back of the knee, the bony covering of the sinus being absent and the cell containing several drops of thick pus under pressure.

The case made an uneventful recovery, with almost complete restoration of hearing. As the posterior cells in this case were far too large to be diploetic cells, it therefore seems reasonable to assume that this group of cells was a rudimentary pneumatic structure. The radiogram of the normal mastoid shows large cells in this same region and also two or three large cells in the tip (Figure 8).

Case 9.—An acute middle ear infection with well defined signs and symptoms of mastoid involvement, occurring in a large pneumatic mastoid (probably type 1).

Hospital case, a man, aged thirty-seven years; admitted to the Rhode Island Hospital May 8, 1917. Case reported by courtesy of Dr. H. P. Abbott, the radiograms of both mastoids being more striking than any in the writer's collection (Figure 14 a, b). For three days previous to admission patient had complained of severe throbbing in the left ear that made sleep impossible. Examination showed redness and bulging of the drum membrane and drooping of the posterior superior canal wall, and tenderness over the mastoid, incision of the drum membrane evacuating a large amount of bloody serum. Three days later patient complained of much pain and tenderness over the mastoid; evening temperature, over 101°. Radiograms were taken that showed evidence of infection in the left mastoid (Figure 14 a, b). Three days later the otorrhea was purulent and very profuse, the pain and temperature being less but the tenderness remaining the same. Within the next three days all mastoid signs and symptoms had disappeared and the otorrhea had practically ceased, the patient being discharged from the hospital.

This case illustrates how quickly stormy and threatening mastoid symptoms may subside in large pneumatic celled mastoids.

Case 10.—A middle ear and mastoid infection, occurring in a pneumatic mastoid, probably type 1. Disappearance of clinical signs with unresolved mastoid infection demonstrated by X-ray examination.

Private patient, a woman, aged forty-five years, seen in consultation with Dr. F. T. Fulton, March 2, 1914. Patient had developed tonsillitis two days previously, complaining of severe pain in the right ear for the past twenty-four hours. As the ear examination was entirely negative, the pain was ascribed to otalgia from the right tonsil, which was found to be inflamed and swollen. The following day the pain had increased in severity, examination revealing well marked mastoid tenderness on deep pressure, especially at the tip. The drum membrane, except for a slight blueness, appeared the same as on the day previous. Because of the pain and tenderness the drum was incised, and several drops of serum evacuated. The following day there was a copious otorrhea, the drum membrane was red and thickened, the clinical signs and symptoms of an acute and threatening mastoid infection being unmistakable. These symptoms persisted for several days and then gradually disappeared. Eighteen days after incision of the drum membrane the middle ear was dry and all clinical signs of mastoiditis had disappeared. Some impairment of hearing remained, patient complaining that the ear felt stuffy and the mastoid felt "stiff and lame." Although inflation through the eustachian catheter improved the hearing somewhat but did not relieve the subjective symptoms, X-ray examination was advised, not with the idea that anything pathologic would be found but that negative findings would have a beneficial mental effect.

A radiogram, taken by Dr. Percy Brown a month later, much to the writer's surprise, showed the right mastoid to be quite cloudy as contrasted with the left, this cloudiness being most marked in the tip and the posterior cells. On the strength of this finding a mastoid operation was advised but refused. A radiogram taken some months later showed apparent clearing up of the upper part of the mastoid, the posterior

portion and the tip remaining cloudy. A stereoradiogram taken recently by Dr. Gerber shows the upper portion of the mastoid to be pneumatic, while in the posterior portion and the tip the cells are almost entirely obliterated. An unusual density of the petrous bone is also shown (Figure 20 a, b). This does not seem to have any especial significance, for at present the hearing in the left ear is normal, while in the right ear the patient hears a whisper at three feet, the test otherwise being practically the same as in the right.

This case shows that subjective mastoid symptoms when accompanied by loss of hearing are significant and should not be treated lightly.

Case 11.—A double middle ear and mastoid infection, both mastoids having large cells widely distributed and a very thick dense cortex. Latent mastoiditis in the right, a slow development of signs and symptoms in the left.

Private patient, a young man, aged twenty-two years, seen in consultation with Dr. A. Corvese, December 21, 1916. Patient developed influenza eight days previously, that was followed four days later by pain in both ears and a slight bloody discharge that stopped within two days, the pain in the ears persisting and the temperature remaining between 101 and 102 degrees. Examination showed redness and thickening of both drums, incision allowing the escape of thick pus. There was no mastoid tenderness. Patient was next seen in the writer's office January 6, 1917. Otorrhea had continued, but temperature had remained normal after the drum incision. Patient had developed tenderness in both mastoids, but while that in the right promptly subsided, slight tenderness remained in the tip of the left. Patient also developed severe shooting pains in the left occipital bone which have persisted. A moderate mucopurulent discharge was found in both ears. On the right side, except for the persistent otorrhea, there were no signs of mastoid involvement; but on the left side there was slight drooping of the posterior superior canal wall, slight tenderness at the tip, and a spot of exquisite tenderness in the occipital bone at a point half way between the auricle and the occipital protuberance, which from its location was thought to have no relation to the mastoid. In-

fection of the left mastoid was considered probable, and a radiogram advised, which was not taken till January 23d.

The radiograms showed both mastoids to be very large with extensive posterior prolongations and a general destruction of cell structure, apparently as widespread in the one as the other. Patient did not consent to operation till a week later, when he was admitted to the Rhode Island Hospital. Since the examination three weeks before, the left mastoid, including the posterior superior canal wall, had become very edematous, the otorrhea being also increased. The discharge from the right ear had remained about the same, and no tenderness or any other sign of mastoid involvement had developed except a slight drooping of the posterior superior canal wall.

At operation the anatomic structure and the pathologic changes were practically the same in both mastoids. There was found externally an absence of tip development, and a warped appearance of the cortex similar to that found in the type 2 infantile mastoids (Cases 2, 3). Removal of an unusually thick and dense cortex revealed an almost complete destruction of cell structure and internal table. Posteriorly the cells were found grouped into nests, having thick dense partitions. These nests all opened into the body of the mastoid, but had no apparent communication with each other. An enormous nest of necrotic cell structure was found extending deeply into the occipital bone. On the left side this cell extension reached the point at which exquisite tenderness had been discovered three weeks previously. Both middle ears were dry on the third day and both mastoids were entirely healed within two weeks.

This case shows the value of X-ray examination in cases of continued otorrhea following middle ear infection.

Case 12.—A double middle ear and mastoid infection occurring in an eight-year-old child. Both mastoids of large size and having a cortex of unusual thickness and density.

Private patient, a girl, aged eight years, seen in consultation with Dr. J. W. Mitchell. Patient and a sister aged ten years had developed influenza the day previously, the older sister running a temperature from 102 to 104 degrees for nearly a week with no ear symptoms whatever.

Patient had complained of pain in the left ear for twelve

hours, examination showing a red and bulging drum, incision of which was followed by the escape of bloody serum. The right drum appeared normal, but was incised the following day because of beginning redness and bulging. The temperature ranged from 100 to 105 degrees for the next three days, but apart from a copious serous otorrhea, there were no signs of mastoid involvement. In consultation with Dr. E. A. Crockett it was decided that in the light of the temperature the sister was then running and the absence of signs in the mastoid, no apprehension need be felt.

The morning temperature became normal a week after the first visit and remained so for the next six days, the evening temperature staying at 99°. During this time the otorrhea lessened in amount, becoming seropurulent in character, but as a slight drooping of the right posterior superior canal wall had developed Dr. Crockett was again called in consultation, when it was decided that the patient was in no immediate need of operative interference. In addition to the low temperature, the decreasing otorrhea and absence of mastoid tenderness or edema, a bacteriologic examination of both ears had shown staphylococcus aureus in pure culture.

As stated before, for six days the temperature did not go above 99°; then for the next five days it steadily increased, mounting higher and higher day by day, the patient meanwhile showing signs of severe sepsis. During this time the drooping in the right canal disappeared and no other signs of mastoid involvement appeared in either mastoid. The otorrhea instead of increasing appeared to be slowly diminishing, so had it not been for the increasing temperature and accompanying sepsis, it would have been thought that the case was progressing favorably. On the fifth day after the commencement of septic symptoms Dr. Gerber, by means of a portable apparatus, took radiograms which when developed showed infection and breaking down of cell structure in both mastoids. Radiograms would have been taken sooner had it been thought possible to secure any definite information by means of a portable apparatus, for negative findings would only have increased the difficulties in this particular case.

The evening temperature this day reached 105°, but the following morning the temperature again dropped to normal,

and patient's condition appeared better than it had for several days. The parents naturally wished to postpone operation, but with the positive evidence of the radiograms at hand were readily convinced of its necessity. A double mastoid operation was performed this same morning, the writer being assisted by his former chief, Dr. Crockett, a courtesy greatly appreciated. Both mastoids were found to be practically alike in both structure and pathology, removal of an unusually thick dense cortex revealing large and extensive necrotic cells filled with pus and granulations. The left sinus was bare for about two-thirds of an inch. Cultures taken from both mastoids showed streptococcus in pure culture, presumably the mucosus capsulatus, although this point was not determined. Two previous examinations of the aural discharge had shown nothing but staphylococcus aureus. For four days following the operation patient appeared very septic, was delirious most of the time and ran a high pulse and temperature. When conditions seemed to be at their worst, the temperature suddenly dropped to normal and the patient made an uninterrupted convalescence.

This case illustrates the difference between hospital and private practice, for the rising temperature and accompanying sepsis were of themselves sufficient to justify exploration of both mastoids, a procedure of easy accomplishment in hospital practice where securing permission to operate is the least of our worries. In this case the father later assured the writer that he would not have consented to the operation in the absence of positive evidence of mastoid involvement, such as we had in the radiograms—in other words, he would not have consented to an "exploratory" operation.

Case 13.—A double decked mastoid, in which the lower deck of cells was discovered at the second secondary operation.

This history is reported from the records of the Massachusetts Charitable Eye and Ear Infirmary, by courtesy of Drs. F. A. Washburn and G. L. Tobey, Jr., the patient having been last admitted during the internship of the writer. The essentials of the hospital records are given, but are somewhat rearranged for the sake of continuity.

Outpatient Record No. 35685a.—Patient, a male child, aged

three years. September 10, 1903. Diagnosis: Secondary mastoiditis. Recommended for admission to house.

House Record.—Mastoid operation five months previously at the Carney Hospital.

September 19. Secondary mastoid operation, old cavity cleaned out, and opening into antrum enlarged, no sinus or dura exposed. Wound healed very slowly.

Outpatient Record (Continued).—November 23. Small amount of superficial granulations. December 12. Wound healed but tissues very soft. August 8, 1910. Old mastoid wound has broken down again; slight discharge; no bare bone. August 9. Recommended for admission to house.

House Record, Volume 30, Page 32.—August 12, 1910. Diagnosis: Unhealed mastoid cavity.

Since the previous operation, September 19, 1903, the mastoid cavity has frequently become moist; the last time about one week ago; no otorrhea.

Examination.—Large depressed cavity in left mastoid with large granulating moist area at bottom in region of antrum. Small sinus evidently leading to middle ear at floor of cavity.

August 17. Operation (Dr. G. L. Tobey, Jr.).—Old cavity was curetted out. A second deck of mastoid cells that had never been opened was found under the posterior canal wall and thoroughly curetted out. Sinus was exposed and found in normal position. Dura over tegmen was also exposed. Antrum was opened very widely. Skin dissected up posteriorly and trimmed. Wound sutured above and below, wick to antrum. The case made a slow but uneventful recovery, the operation cavity, showing but little tendency to granulate, healed by dermatization.

It would be interesting to know the character of the cell structure found at the first operation. The child was then three years old, an age in which well marked pneumatic structure is unusual, although Stewart¹⁴ has demonstrated by X-ray examination an extensive pneumatic development at the age of two years. According to the writer's remembrance of the third operation, performed seven years after the second, the old operation cavity was large and extensive, suggesting the previous removal of considerable cell structure. The second deck of cells, separated from the cavity by a layer of dense

bone, extended deeply into the posterior part of the pyramid. A stereoradiogram of this mastoid would in all probability have disclosed the infected cells as in Case 7 (Figure 19).

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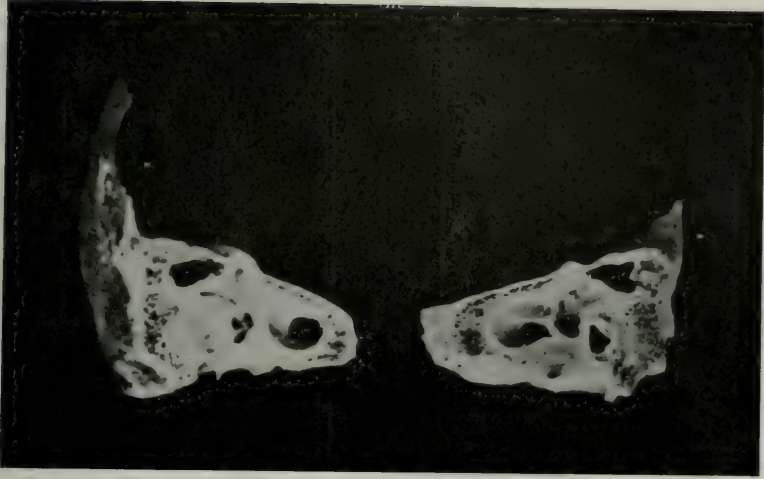


Fig. 1. Right bone of a male aged nine months, showing the diploetic type of "mastoid mass" in infancy.

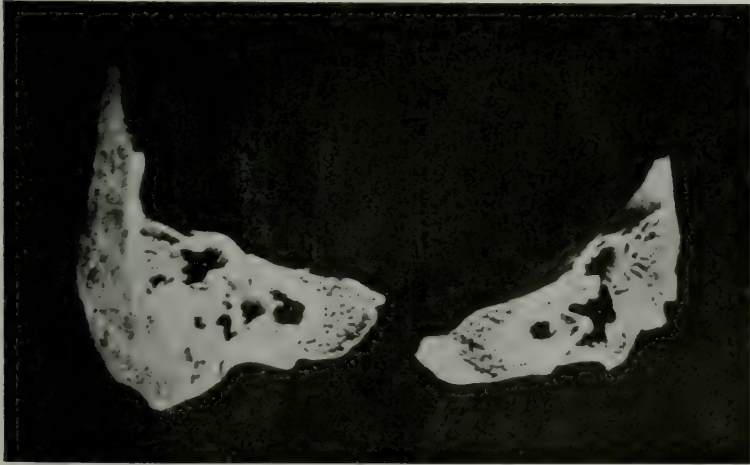


Fig. 2. Right bone of a male aged seven months, showing the dense type of "mastoid mass" in infancy.

(Figures 1, 2, 3, and 4 are reproductions of Cheatle's original illustrations (9)).

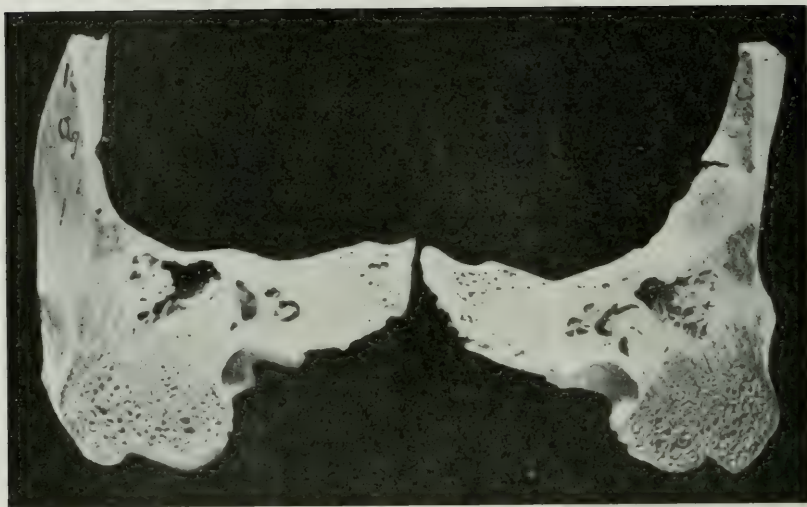


Fig. 3. Right bone of a male aged 42 years, showing the diploetic infantile type in the adult, type 1.

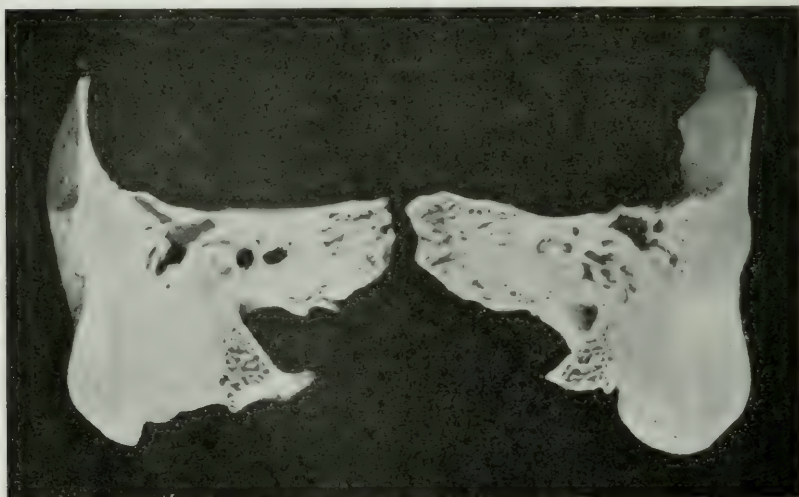


Fig. 4. Right adult bone, showing the dense infantile type in the adult, type 2.

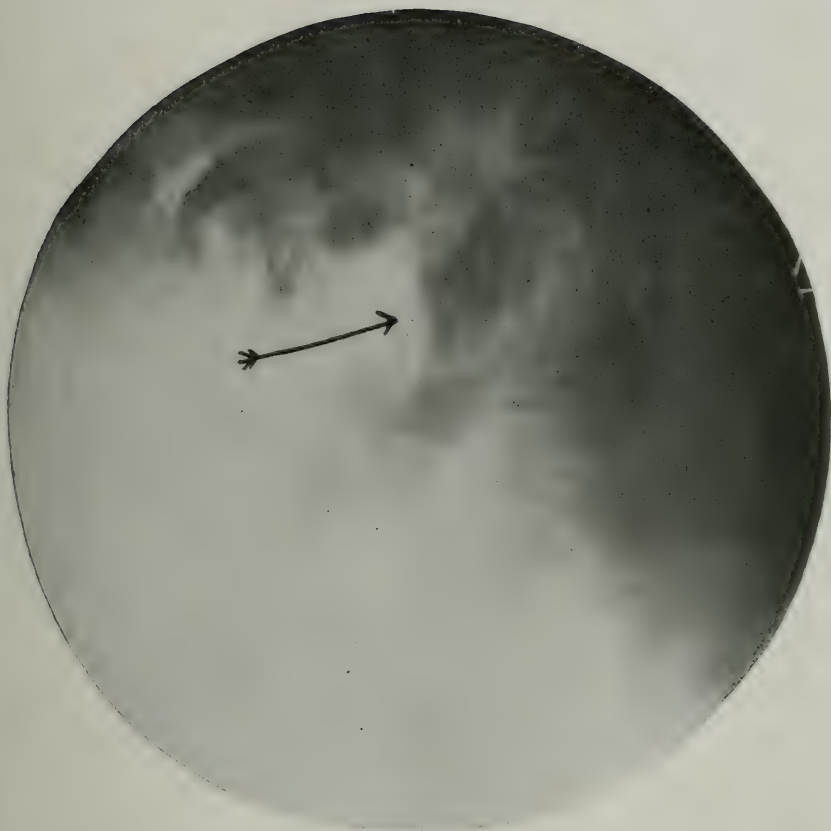


Fig. 5. A right infantile mastoid, probably type 2. Print from the pathologic stereoradiogram Case 1. A sinus found to be very superficial at operation.

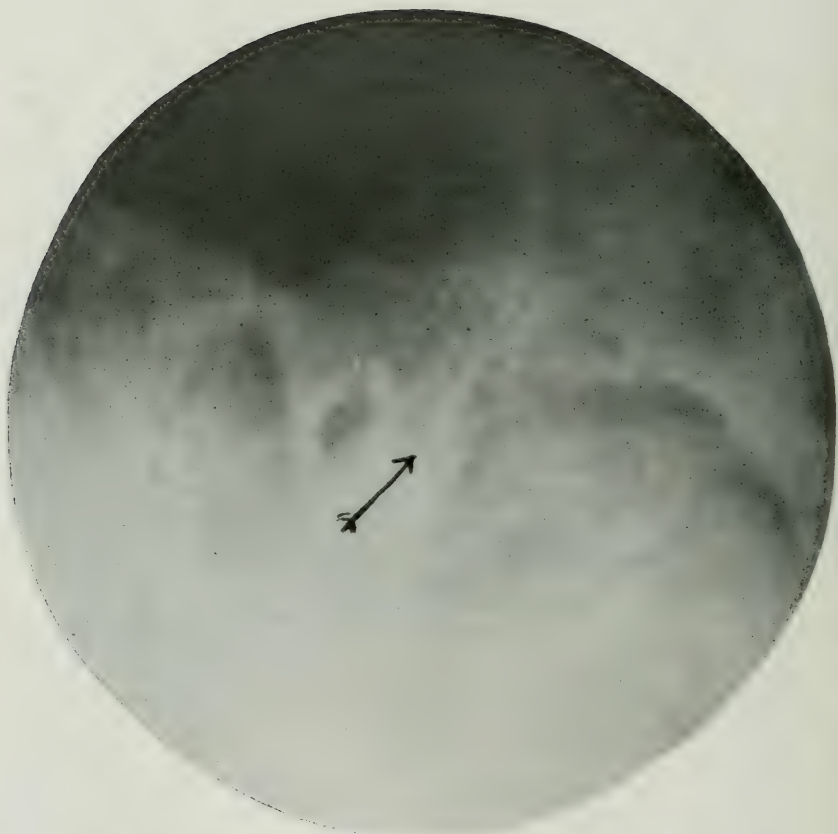


Fig. 6. A right infantile mastoid, probably type 1. Print from the normal stereoradiogram Case 5. On the left side a type 1 infantile mastoid was found at operation.

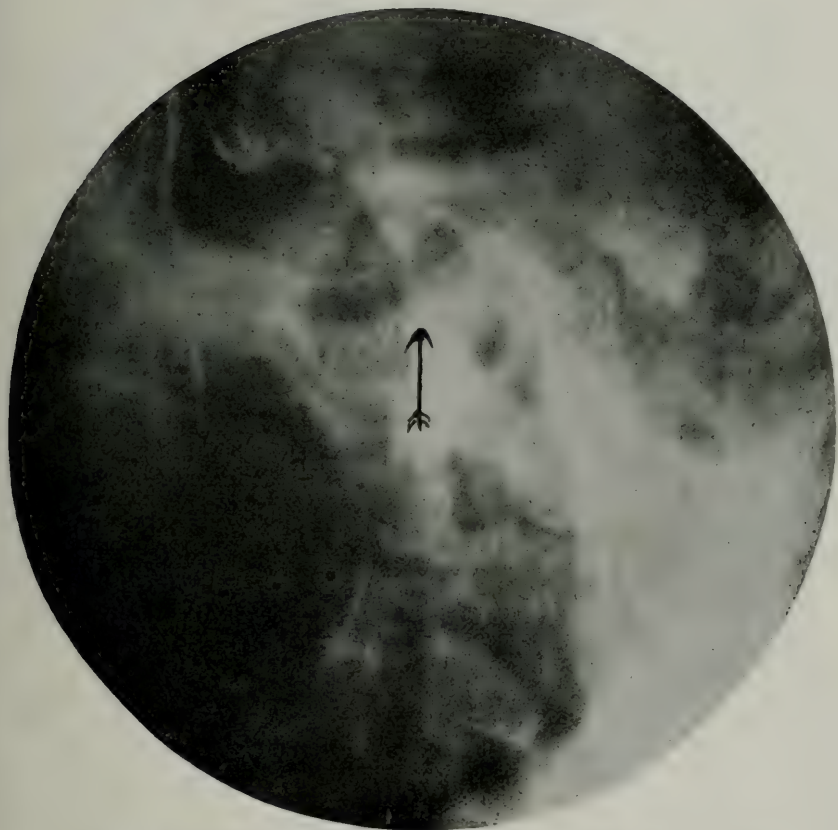


Fig. 7. A normal left infantile mastoid, probably type 2. Print from the radiogram Case 6, in which there was pain and mastoid tenderness without other evidence of middle ear or mastoid infection, probably hysterical.

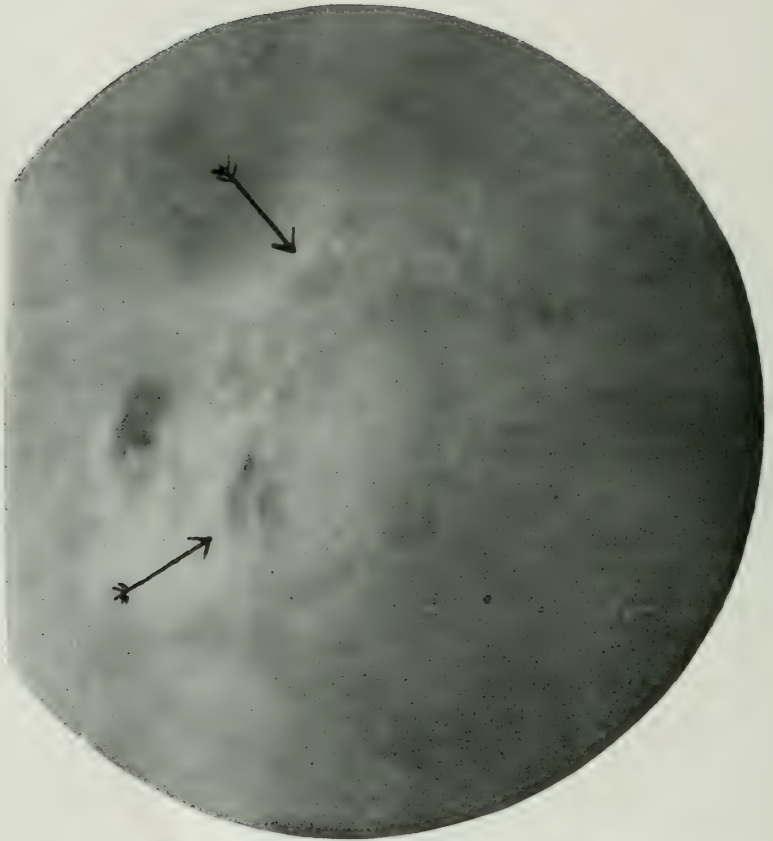


Fig. 8. A right infantile mastoid in a man aged 67 years, probably type 3. Print from the normal radiogram Case 8. A few large cells are seen in the tip and along the squamomastoid suture, probably rudimentary pneumatic structure. Compare with Fig. 9.



Fig. 9. A right normal mastoid in a girl aged 8 years, showing a few large scattered cells, probably rudimentary pneumatic structure. Compare with Fig. 8.



Fig. 10a. The left normal pneumatic mastoid Case 3.

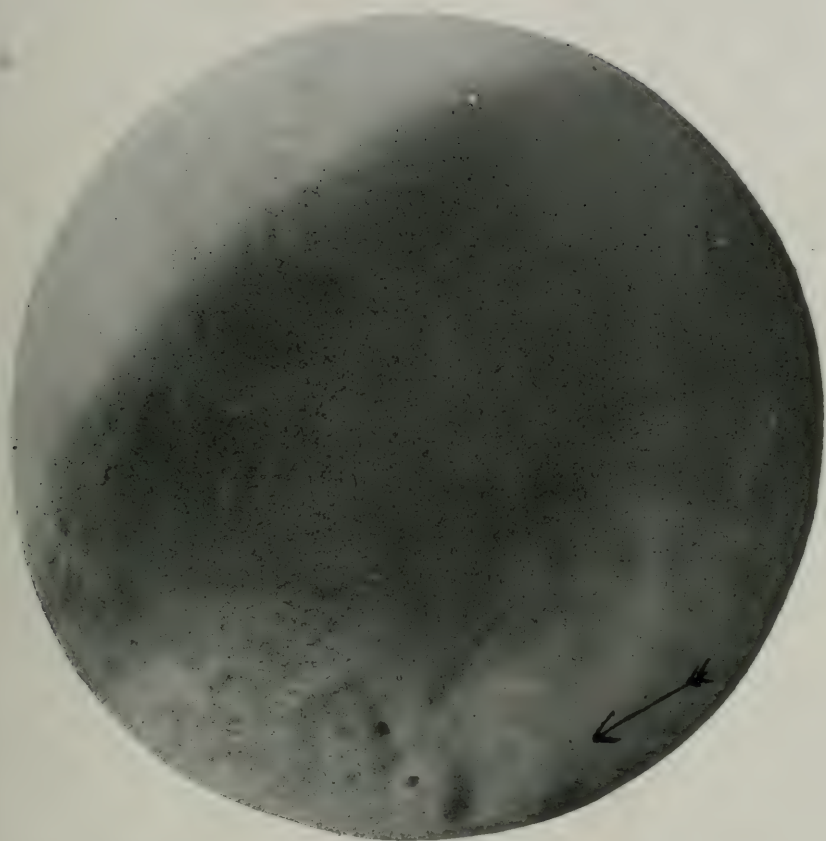


Fig. 10b. The right type 2 infantile mastoid. Print from the pathologic radiogram Case 3. This was interpreted before operation as a large broken down mastoid. Compare with Fig. 10a.

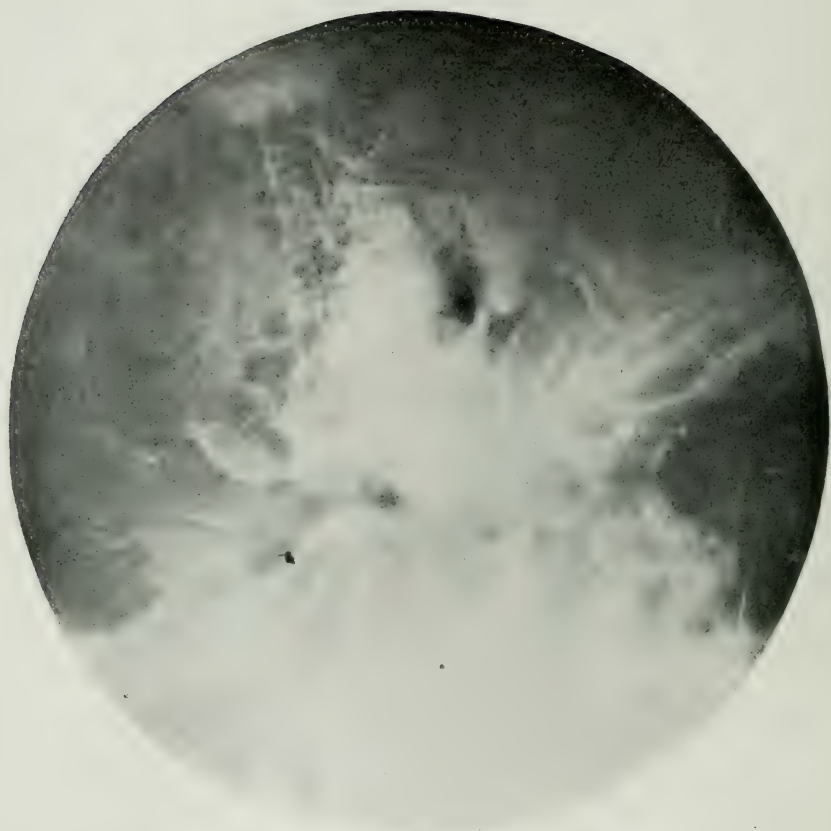


Fig. 11a. The right normal pneumatic mastoid Case 4.

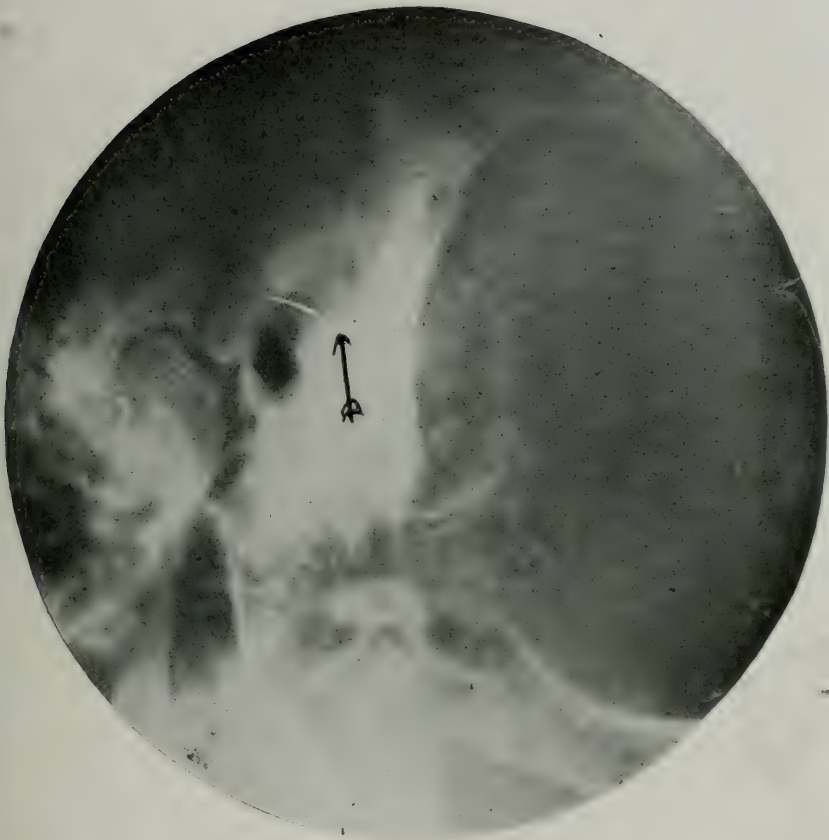


Fig. 11b. The left pathologic mastoid Case 4. At operation a chronically infected antrum was found deeply situated in dense bone.

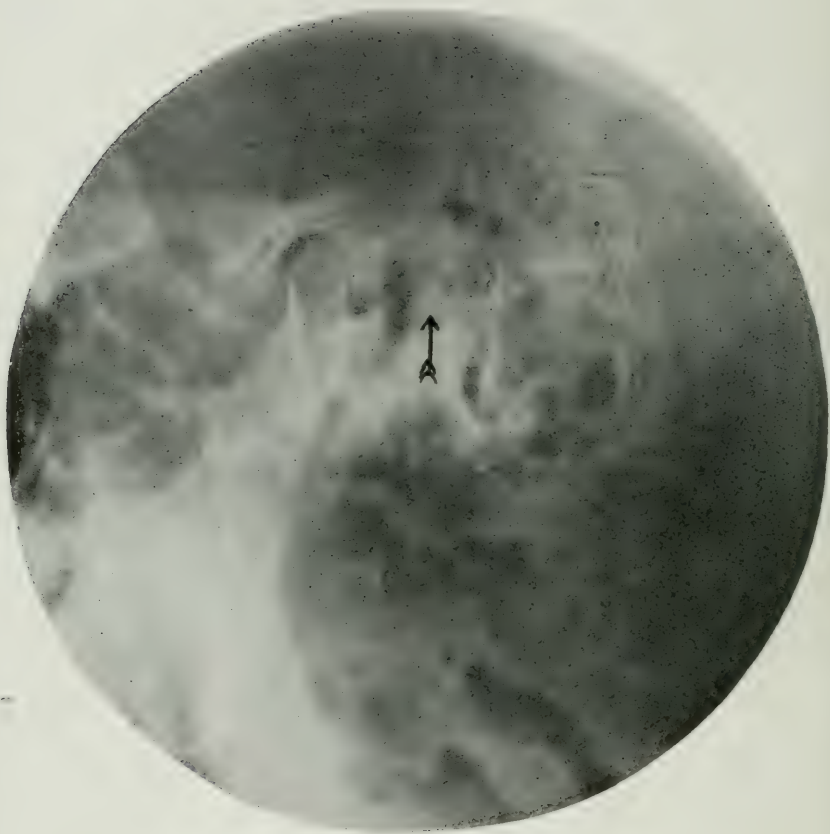


Fig. 12. A left pneumatic mastoid, probably type 1. Note the relation of the middle ear, additus and antrum.

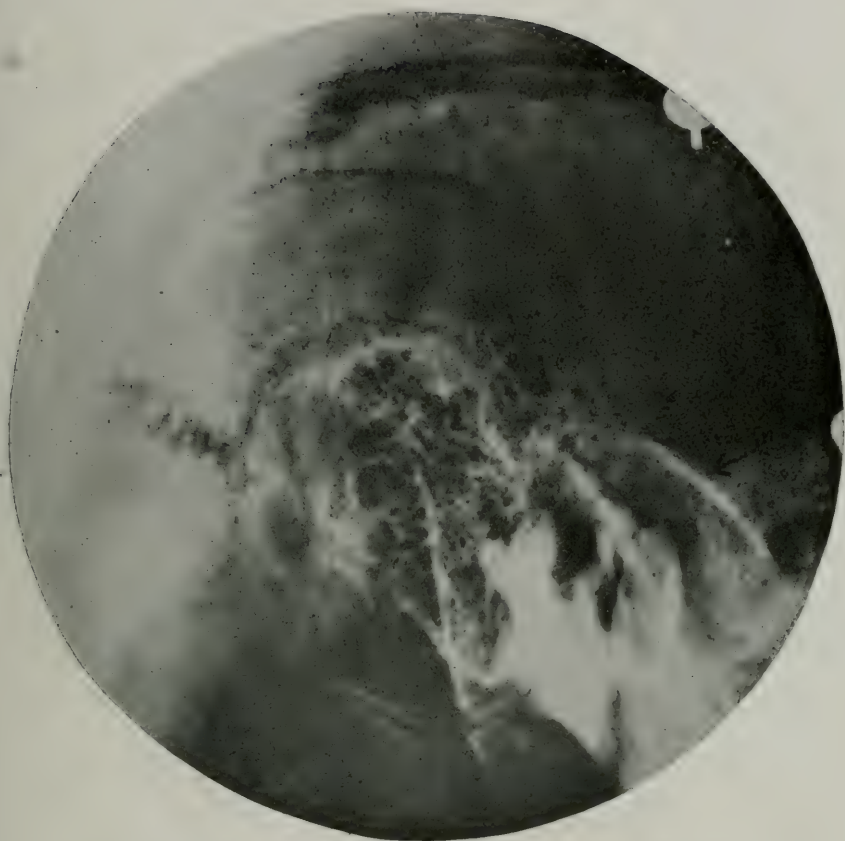


Fig. 13. Print from a stereoradiogram of a skull, showing zygomatic cells extending to the temporomandibular articulation.

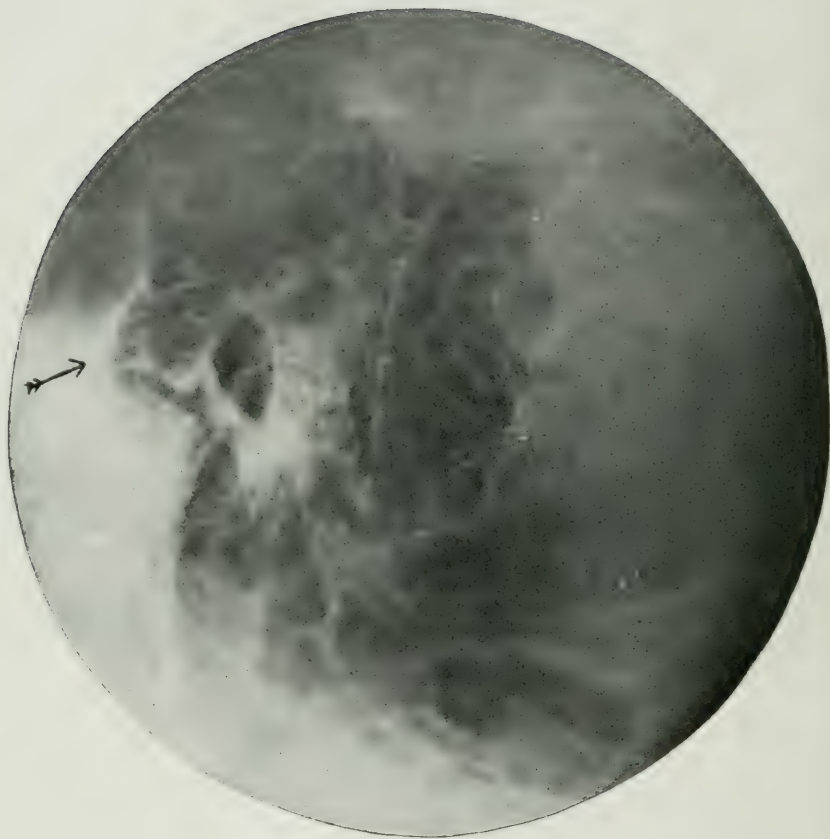


Fig. 14a. The right normal mastoid Case 9, showing zygomatic cells nearly surrounding the temporomandibular articulation. Compare with Fig. 13.



Fig. 14b. A left pneumatic mastoid, probably type 1. Print from the pathologic radiogram Case 9. Zygomatic cells are seen extending to the temporomandibular articulation. There is general haziness of cells and apparent destruction of cell walls in the upper two-thirds.

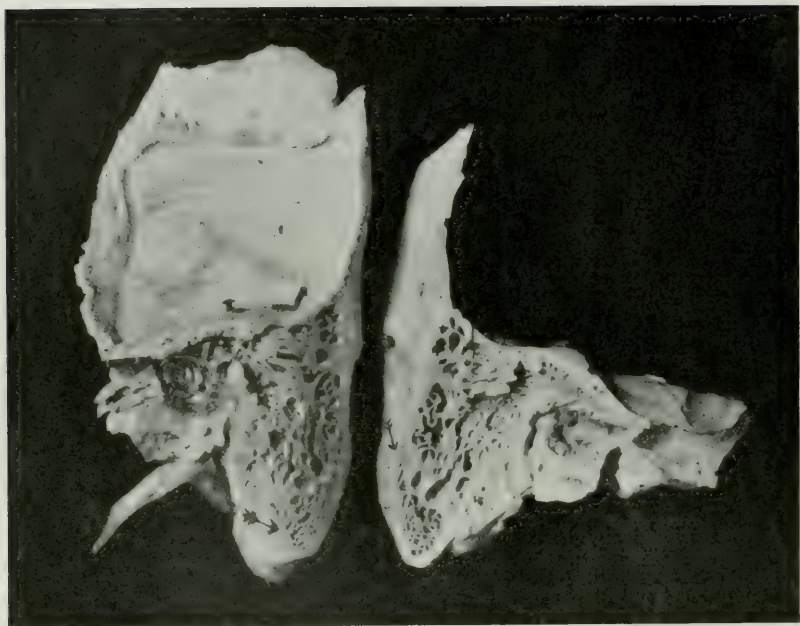


Fig. 15. Photograph of a bone showing a nest of large diploetic cells in the tip separated from the pneumatic structure by a layer of compact bone. Compare with Fig. 16.

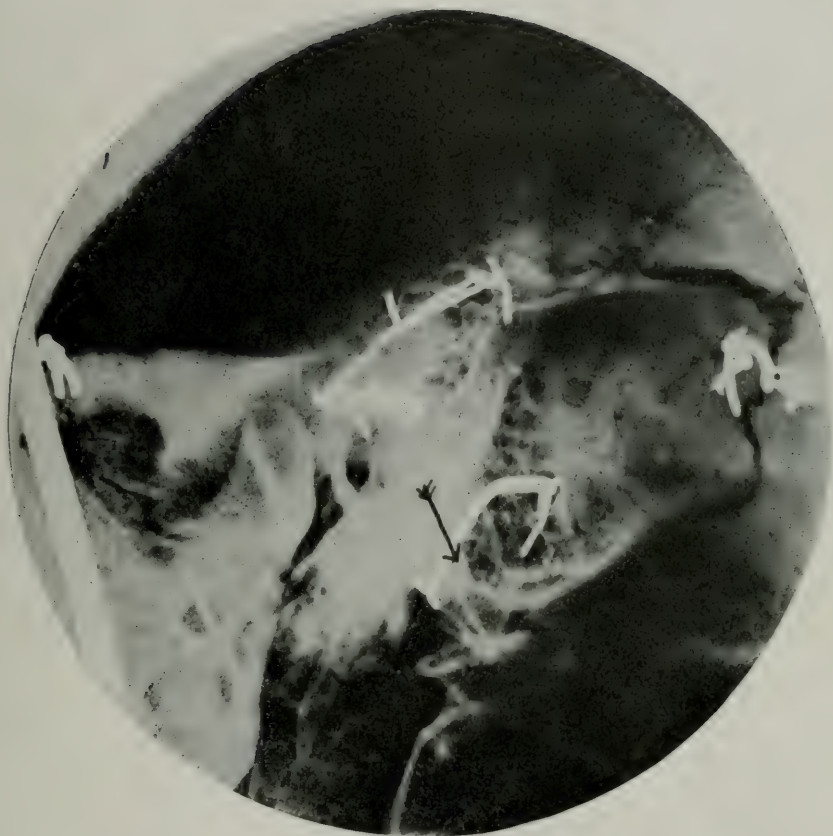


Fig. 16. Print from stereoradiogram of the bone shown in Fig. 15. Arrow points to nest of diploetic cells in the tip separated from the pneumatic structure by a layer of compact bone. This is even more evident when viewed stereoscopically.



Fig. 17a. Print from the stereoradiogram of a left normal pneumatic mastoid, probably type 1.

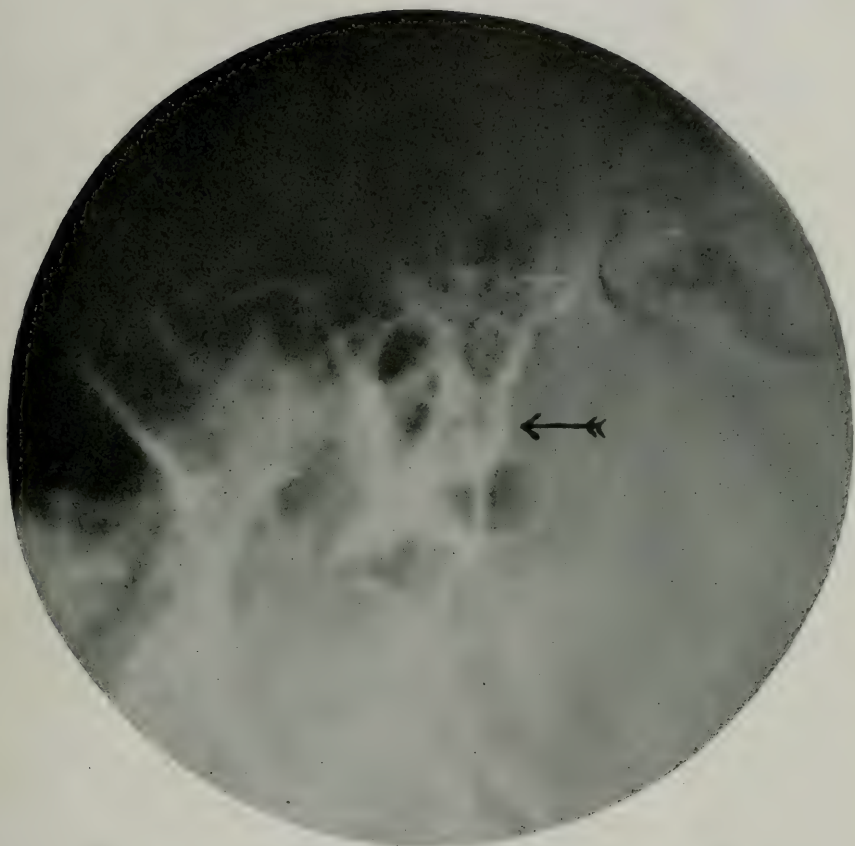


Fig. 17b. The right normal mastoid of same individual as Fig. 17a. Arrow points to apparent diploetic structure. Study of the stereoscopic plates shows that this is really many large pneumatic cells superimposed.

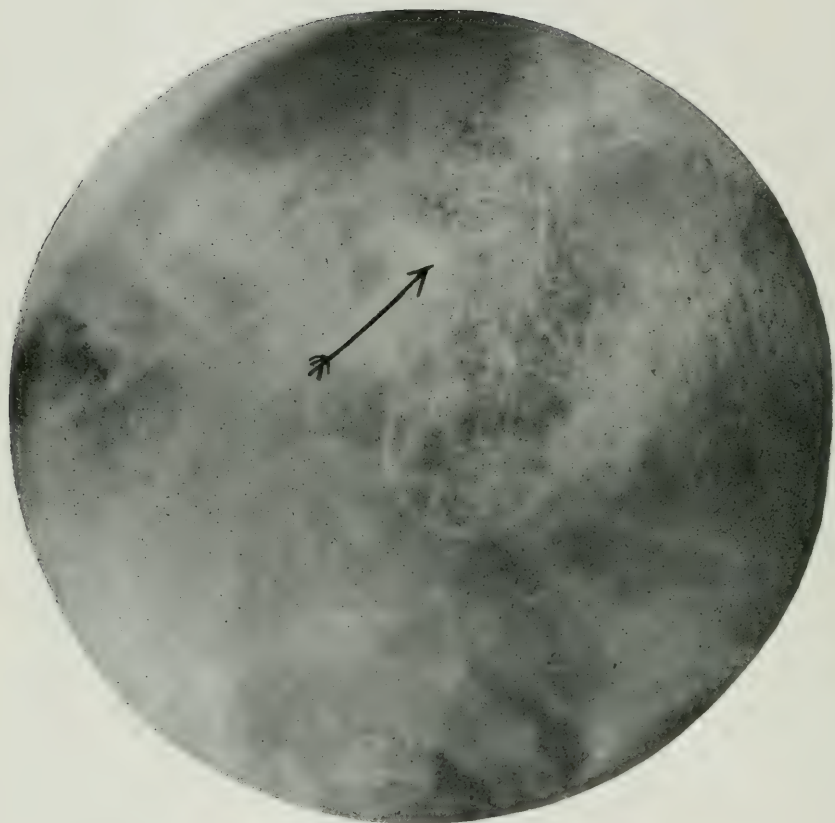


Fig. 18. A right mastoid, showing mixed diploetic and pneumatic cells. Stereoscopic study shows probable double decked arrangement, with diploetic cells underneath and pneumatic cells external.

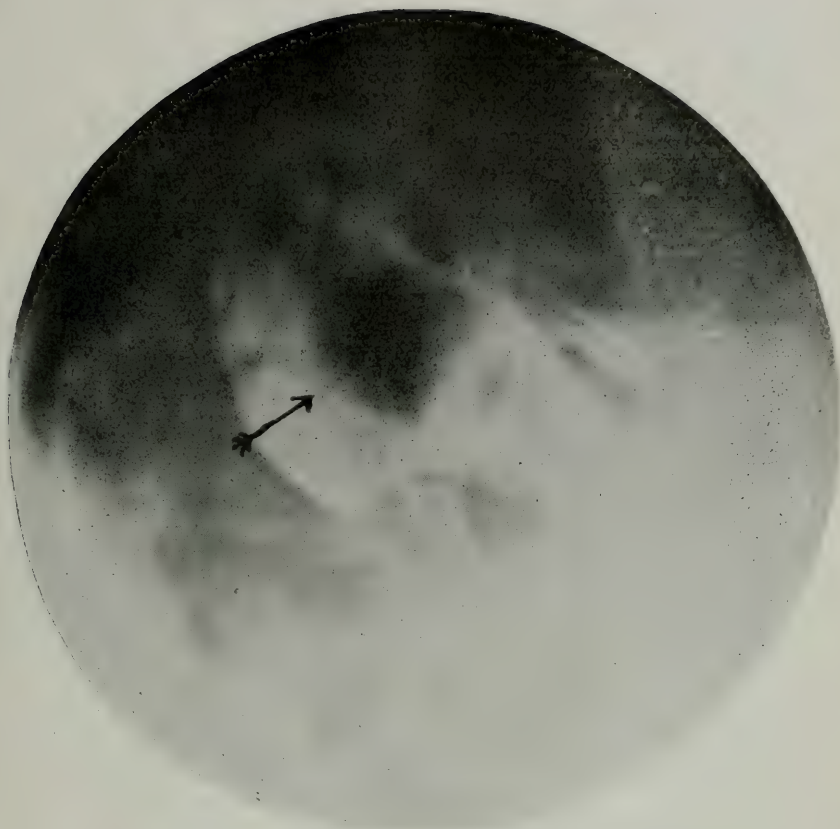


Fig.19. Operation cavity left mastoid. Print from stereoradiogram Case 7. Arrow points to infected residual cells in floor of cavity overlying sinus. This is shown very clearly when viewed stereoscopically.



Fig. 20a. The normal left pneumatic mastoid, probably type 1.
Case 10. Emissary vein shows very clearly.

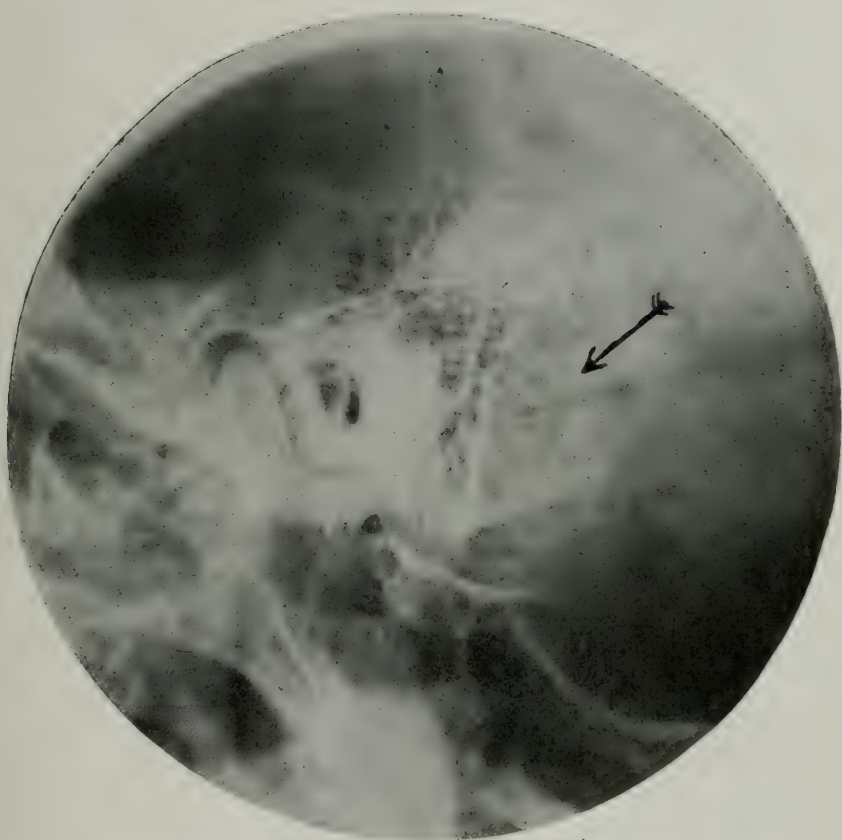


Fig. 20b. Print from stereoradiogram of right mastoid, Case 10. Posterior portion and tip show probable sclerosis with a few scattered hazy cell remnants. Compare with Fig. 20a.

LV.

ANATOMY OF THE NASAL ACCESSORY SINUSES IN INFANCY AND CHILDHOOD.*

BY WARREN B. DAVIS, M. D.,

PHILADELPHIA.

Types of development and the extent of pneumatization found in the nasal accessory sinus areas during infancy and childhood show as marked variations at any given period of development as are found in individual adult cases. The average extent, however, of this pneumatization in infancy and the rate of its development during childhood have usually been underestimated—probably because the bodies of children are not often available for dissections—and opinions have thus been based in many instances on too few observations to make them of practical value.

In this series of dissections of one hundred and sixty lateral nasal walls, upon which the following observations are based, we have endeavored to secure a sufficient number to make the average development found in the different years of childhood of value both to the anatomist and to the clinician. We have considered embryologic and fetal development in detail elsewhere, thus all such observations will be omitted here. The ages of specimens and the number of lateral nasal walls dissected and studied were as follows:

Under 1 year.....	28	Ten years	4
One year.....	20	Eleven years	2
Two years.....	16	Twelve years	2
Three years.....	12	Thirteen years	6
Four years.....	16	Fourteen years.....	2
Five years.....	6	Fifteen years.....	6
Six years	16	Sixteen years.....	6
Seven years.....	10		
Eight years.....	10	Total.....	160
Nine years	4		

*Read before the section of Laryngology, Otology and Rhinology at the meeting of the American Medical Association, Chicago, June 14, 1918.

The ethmoidal, frontal, maxillary and sphenoidal areas will be considered separately. Pneumatization of the lateral ethmoidal mass proper is, in a majority of cases, complete at birth (Figure 1).^{*} The cells subsequently increase in size, not only by expansion as the ethmoidal area grows, but also by invasion of the surrounding areas, so that the distal boundaries of the cells may soon extend into the frontal region (Figure 13), into the supraorbital plate of the frontal bone, into the infraorbital plate of the maxilla (Fig. 19), into the orbital process of the palate bone, into the agger nasi (Figure 10), or into the middle concha (Figure 24); the extent into any or all the different areas showing great variations.

The *conchæ frontales* (Figure 18) are relatively more prominent in early childhood than they are in adult life. Three *conchæ frontales* represent the complete formation, but two are more frequently found, while in a few cases only one, and in still others none is demonstrable (Figure 20). *Cellulæ frontales* thus vary from two to four in number, or in the absence of all frontal *conchæ* there is simply the smooth *recessus conchalis*. When *cellulæ frontales* are few in number or are absent, then the *cellulæ infundibulares* are apt to be more numerous and to occupy a larger area (Figure 13).

The *sinus frontalis* has its origin in all cases from the anterior ethmoidal area—the relative rate of advancement of the cells of the different groups determining which will eventually become the sinus. In very few cases can the route of development be demonstrated with absolute certainty before the sixth month of postnatal life (Figure 4), and in many instances it is near the end of the first year (Figure 5).

In 41 per cent of cases the development was by extension of one of the *cellulæ frontales* (Figures 5, 18, 21 and 22); in 18.4 per cent, by extension of the *recessus conchalis*—no *cellulæ frontales* being demonstrable (Figure 20); in 1 per cent, by extension of a *cellula ethmoidalis anterior* having its origin from the suprabullar furrow (Figure 16); in 24 per cent, by extension of one of the *cellulæ infundibulares* (Figure 7); and in 15.6 per cent, by a direct extension from the

^{*}Illustrations are from "Development and Anatomy of the Nasal Accessory Sinuses in Man" (Davis), by Courtesy of the W. B. Saunders Co.

infundibulum ethmoidale (Figure 17). Approximately 4 per cent of cases show supernumerary sinus frontales, which may develop from two cellule frontales (Figure 18), from two cellule infundibulares, or from any combination of the above mentioned routes of development of the usual sinus frontales.

From whichever source a frontal sinus may have its origin, the process of pneumatization gradually extends from that portion of the anterior ethmoidal area toward and into the inferior portion of the frontal bone, advancing as the cancellous bone is absorbed. In an average case the sinus begins its ascent into the vertical portion of the frontal bone during the second year, and at three years is 3.8 millimeters above the level of the nasion, and continues its vertical advance at an average rate of approximately 1.5 millimeter per year until the fifteen year (Figure 21).

The sinus maxillaris at birth is an oblong ovoidal sinus (Figure 1), its diameters averaging 8.2 millimeters anteroposteriorly, 3.3 millimeters vertically and 2.8 millimeters laterally. As the body of the maxilla increases in its diameters there is an increase in the extent of pneumatization, averaging, until the ninth year, 2 millimeters each year in both the vertical and lateral diameters, and 3 millimeters anteroposteriorly. After the ninth year development advances more slowly in all diameters, reaching by the fifteenth year a form which approximates the usual adult type, later changes occurring chiefly in the posteroinferior angle which descends as the third molar tooth erupts. In its lateral development an average sinus maxillaris reaches the sagittal plane of the nervus infraorbitalis by the end of the first year, passes beneath the nerve during the second year, after which time the canal for the nerve is a ridge of varying prominence (Figures 8 and 9).

The average relation of the floor of the maxillary sinus to the nasal floor in the different years of childhood is of clinical importance in determining the point for making punctures of the medial wall for diagnostic or therapeutic measures. Under one year (Figure 3) the level of the average sinus floor is 4.2 millimeters superior to the floor of the nasal fossa. This average difference decreases (Figures 8, 9 and 19) approximately 0.5 millimeter each year, until the eighth or ninth year, when the floors are on the same level.

In the majority of older cases the maxillary sinus floor is from 1 millimeter to 7.5 millimeters below the level of the nasal floor (Figure 23).

The ostium maxillare accessorium (Figures 10, 13 and 16) has no embryologic significance in its development, but is purely the result of progressive thinning of the medial wall of the sinus at a point where there is no osseous lamina between the mucosa lining the sinus and that lining the meatus medius. The youngest specimen showing an accessory ostium was from a child four years, three months and two days old. In specimens over this age accessory ostia were present in 15 per cent of cases. In 76 per cent of cases showing accessory ostia, there were small mucous retention cysts in the mucosa lining the medial walls of the sinus maxillares (Figures 13 and 16).

The sinus sphenoidalis develops as an extension from the posterosuperior portion of the recessus sphenothmoidalis. Under one year of age (Figure 2) the diameters of an average sinus sphenoidalis are 2.8 millimeters vertically, 2 millimeters laterally and 1.5 millimeters anteroposteriorly. Its advancement is at first most marked in a posteroinferior and slightly lateral direction. Its anteroinferior wall is formed by that portion of the posterior nasal capsule in which the concha sphenoidalis, or ossiculum Bertini, has developed and shows well advanced ossification at birth (Figure 2). During the second or third year this bone becomes firmly attached to the body of the sphenoid.

The sinus sphenoidalis develops more rapidly posterolaterally than it does directly posteriorly (Figure 6). The lateral wall of the average sinus soon becomes quite thin—one millimeter or less in its thinnest portion by the end of the second or during the third year, thus bringing the sinus into close relation to the cranial nerves passing just lateral to the body of the sphenoid (Figure 15). The floor of the sinus sphenoidalis is in many instances in close relation to the Vidian nerve by the end of the sixth year.

The septum sphenoidale is relatively quite thick in infancy, averaging 7 millimeters. The medial advancement of resorption is such that the septum reaches a thinness of 1 millimeter or less by the ninth or tenth year.

In average cases the rate of resorption of the body of the sphenoid is such that by the eighth to the tenth year the posterosuperior portion of the sinus lies beneath the anterior portion of the sella turcica, and by the fifteenth year is usually separated from the hypophysis by a very thin lamina of compact bone (Figures 10, 11, 12, 14, 18, 20, 22, 23 and 24).

In many instances pneumatization extends by the fourteenth year well into the processus pterygoideus, in which cases a distinct ridge (Figure 23) marks the nervus canalis pterygoidei (Vidii).

We hope that the above described types and extents of pneumatization will furnish a working anatomic basis for the consideration of the symptoms and the treatment of pathologic conditions occurring in the accessory sinuses during the different years of childhood.

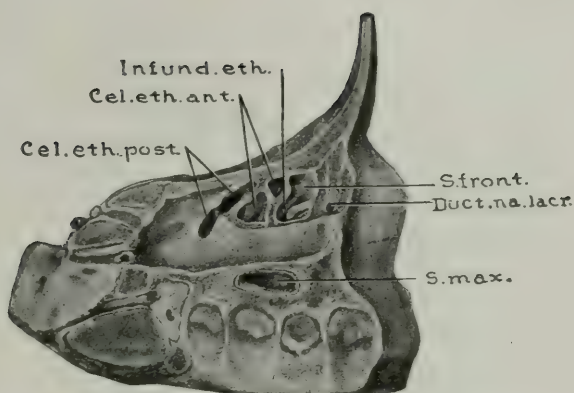


Fig. 1.—Specimen From a Child Eight Days Old. (Series D, No. 1.)*

By sagittal sections removing the lateral portion of frontal bone, lamina papyracea of ethmoid, and lateral portion of maxilla—the sinus maxillaris, cellulæ ethmoidales, anterior and posterior, infundibulum ethmoidale, and the primitive sinus frontalis are brought into view. S.front., Primitive sinus frontalis; Duct.na.lacr., ductus nasolacrimalis; S.max., sinus maxillaris; Cel.eth.post., cellulæ ethmoidales posterior; Cel.eth.ant., cellulæ ethmoidales anterior; Infund.eth., infundibulum ethmoidale.

*Illustrations are reproduced through the courtesy of the W.B.Saunders Company.

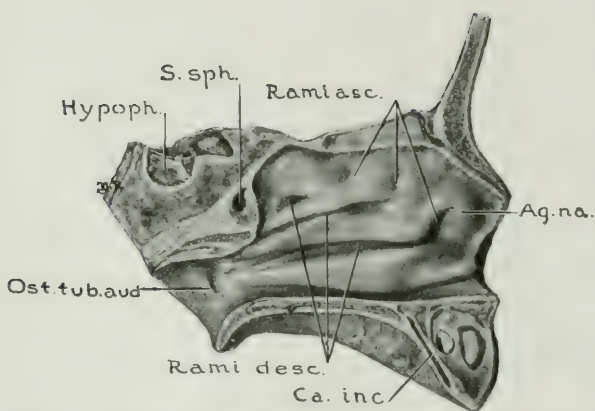


Fig 2.—Specimen From a Child Eight Days Old. (Series D, No. 1.)

Sagittal section in median line through frontal and maxillary bones and 3 mm. to left of median line through sphenoid bone. Shows the left lateral nasal wall, the ascending and the descending rami of the meatuses, also the extent of development of the sinus sphenoidalis. Note that the anteroinferior wall of the sinus sphenoidalis (concha sphenoidalis or ossiculum Bertini) is well ossified. Ag.na., Agger nasi; Ca.inc., canalis incisivus; Rami desc., rami descendens of ethmoidal meatuses; Ost.tub.aud., ostium tubæ auditivæ; Hypoph., hypophysis; S.sph., sinus sphenoidalis; Rami asc., rami ascendens of ethmoidal meatuses.

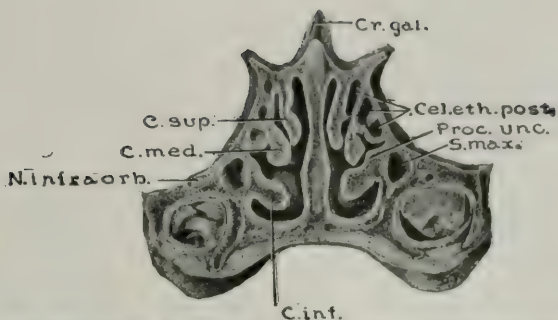


Fig. 3.—Specimen From a Child One Month and Eight Days Old.
(Series D, No. 2.)

Posterior view of coronal section cut 16 mm. posterior to the nasion, showing the extent of superoinferior and lateral development of sinus maxillaris and cellulae ethmoidales posterior. Note the proximity of developing teeth to the orbital floor. Cr.gal., Crista galli; Cel.eth.post., cellulae ethmoidales posterior; Proc.unc., posterior extremity of processus uncinatus; S.max., sinus maxillaris; C.inf., concha inferior; N.infraorb., nervus infraorbitalis; C.med., concha media; C.sup., concha superior.

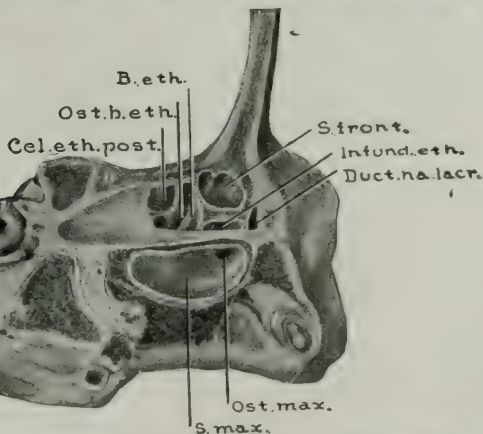


Fig. 4.—Specimen From a Child Four Months and Twenty-seven Days Old.
(Series D, No. 5.)

Lateral portions of frontal, ethmoidal, and maxillary areas have been removed to show the extent of pneumatization. S.front., sinus frontalis developing from a furrow in the recessus conchalis; Infund.eth., infundibulum ethmoidale; Duct.na.lacr., ductus nasolacrimalis; Ost.max., ostium maxillare; S.max., sinus maxillaris; Cel.eth.post., cellula ethmoidalis posterior; Ost.b.eth., ostium bullae ethmoidalis, opening into the suprabullar furrow; B.eth., bulla ethmoidalis.

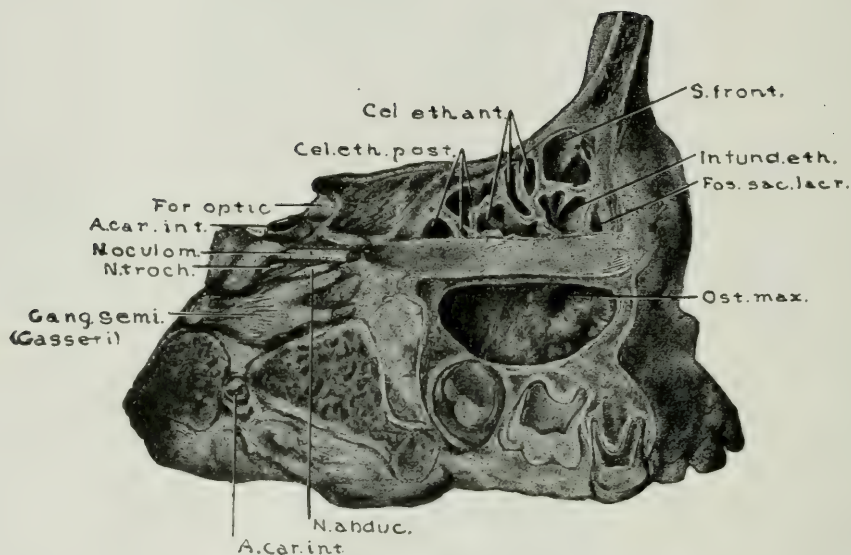


Fig. 5.—Specimen From a Child One Year, Four Months and Seven Days Old. Lateral View of Frontal, Ethmoidal and Maxillary Sinus Areas. (Series D, No. 14.)

S.front., Sinus frontalis developing from a frontal cell; Infund.eth., infundibulum ethmoidale; Fos.sac.lacr., fossa sacci lacrimalis; Ost.max., ostium maxillare; N.abduc., nervus abducens; A.car.int., arteria carotis interna; Gang.semi., ganglion semilunare (Gasseri); N.och., nervus trochlearis; N.och., nervus oculomotorius; For.optic., foramen opticum; Cel.eth.post., cellulae ethmoidales posterior; Cel.eth.ant., cellulae ethmoidales anterior.

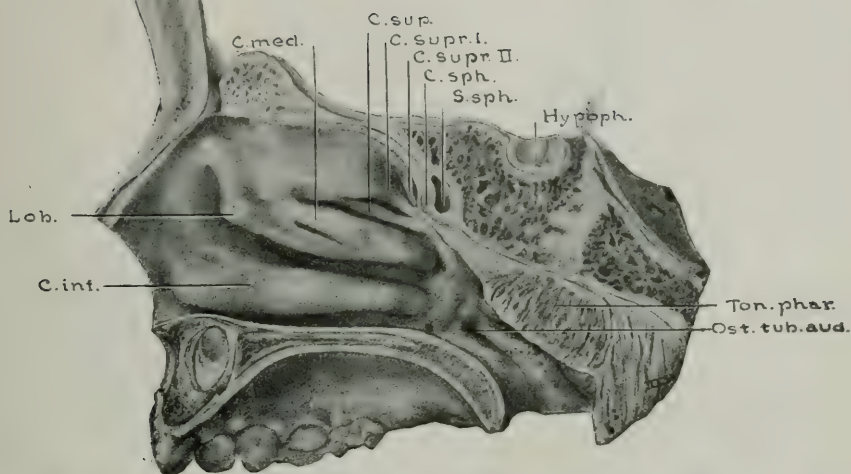


Fig. 6.—Specimen From a Child One Year, Ten Months, and Thirteen Days Old. Sagittal Section Showing Lateral Wall of the Nasal Cavity and the Sinus Sphenoidalis. (Series D, No. 20.)

Note the overlapping of the concha superior by the anterior portion of the concha suprema I; also note the accessory furrow on the medial surface of the concha media. In a plane more lateral than that shown in the illustration, the sinus sphenoidalis is more extensively developed in the posterolateral direction, its inferolateral wall being only 1 mm. from the fossa pterygopalatina and 2 mm. from the foramen rotundum. C.med., Concha media; C.sup., concha superior; C.supr. I, concha suprema I; C. supr. II, concha suprema II; C.sph., concha sphenoidalis (ossiculum Bertini); S.sph., sinus sphenoidalis; Hypoph., hypophysis; Ton.phar., tonsilla pharyngea; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; C.inf., concha inferior; Lob., lobulus.

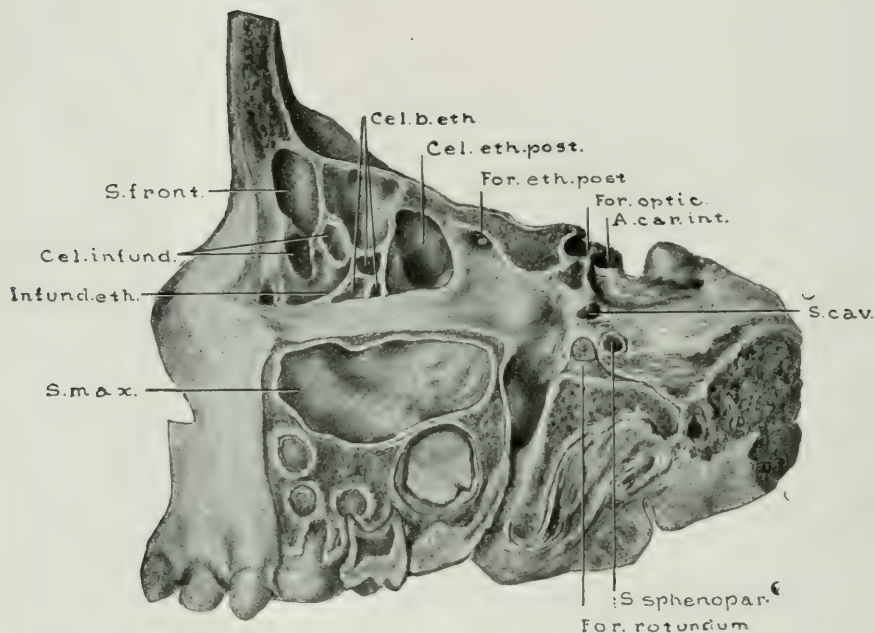


Fig. 7.—Specimen from a Child Two Years, Six Months and Twelve Days Old. (Series D, No. 25.)

Lateral view of left frontal, ethmoidal and maxillary sinus areas. Note advance of sinus frontalis into the vertical portion of the frontal bone. Cel.b.eth., Cellulae bullae ethmoidales; Cel.eth.post., cellula ethmoidalis posterior; For.eth.post., foramen ethmoidale posterius; For.optic., foramen opticum; A.car.int., arteria carotis interna; S.cav., sinus cavernosus; S.sphenopar., sinus sphenoparietalis; For.rotundum, foramen rotundum; S.max., sinus maxillaris; Infund.eth., infundibulum ethmoidale; Cel.infund., cellulae infundibulares; S.front., sinus frontalis.

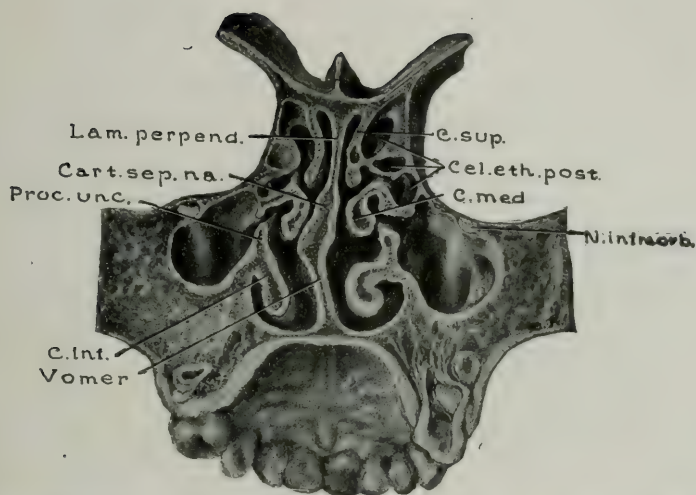


Fig. 8.—Specimen From a Child, Three Years, Five Months and Eight Days Old. (Series D, No. 32.)

Posterior view of coronal section cut 28.5 mm. posterior to nasion, showing the extent of lateral and superoinferior development of sinus maxillaris, the osseus ridge beneath nervus infraorbitalis, cellulæ ethmoidales posterior, and small conchal cells developing in each concha nasalis superior. The ostia maxillaria are larger than usual in the anteroposterior diameter. Note deflection of septum nasi and its influence on each concha media. C.sup., Concha superior; Cel.eth.post., cellulæ ethmoidales posterior; C.med., concha media; N.infraorb., nervus infraorbitalis; C.inf., concha inferior; Proc.unc., processus uncinatus; Cart.sep.na., cartilage septi nasi; Lam.perpend., lamina perpendicularis.

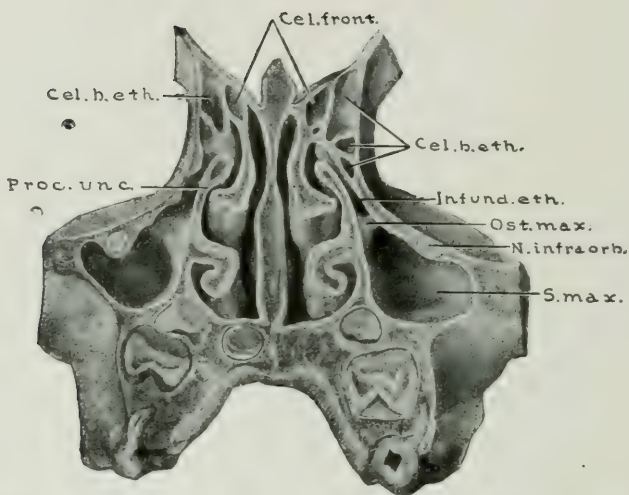


Fig. 9.—Specimen From a Child Four Years, Seven Months and Nineteen Days Old. (Series D, No. 40.)

Anterior view of coronal section, cut 16 mm. posterior to the nasion, showing the lateral and superoinferior extent of the maxillary sinuses, their relations to developing teeth, and the relations of the ostium maxillare to the infundibulum ethmoidale. Note ridge beneath the right nervus infraorbitalis. The bullar cells have their ostia in the suprabullar furrow. The ostia of the cellulæ frontales are medial to the processus uncinatus and the bulla ethmoidalis. Cel.front., Cellulæ frontales; Cel.b.eth., cellulæ bullæ ethmoidales; Infund.eth., infundibulum ethmoidale; Ost.max., ostium maxillare; N.infraorb., nervus infraorbitalis; S.max., sinus maxillaris; Proc.unc., processus uncinatus.

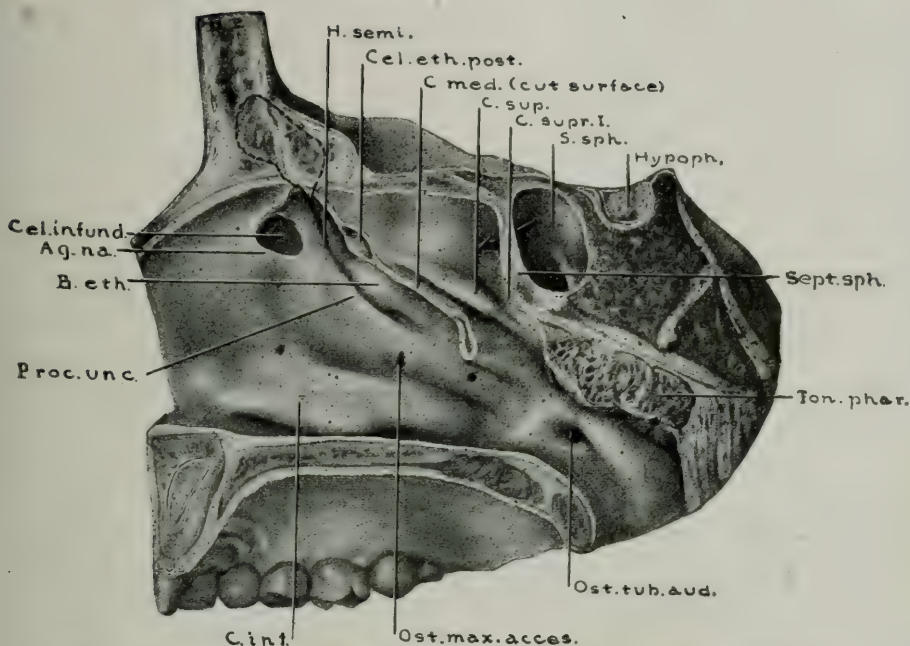


Fig. 10.—Specimen From a Child Five Years, Ten Months and Twenty-two Days Old. (Series D, No. 45.)

Sagittal section, $\frac{3}{4}$ mm. to the right of median line anteriorly; section through body of the sphenoid 2 mm. to the right of median line. Anterior portion of concha media has been removed to show the lateral nasal wall. Medial wall of an infundibular cell was removed with the anterior attachment of the concha media. Ostium frontale in this case communicates both with infundibulum and with the recessus conchalis medial to the processus uncinatus. Dotted line indicates outline of sinus frontalis. H.sem., Hiatus semilunaris; Cel.eth.post., cellula ethmoidalis posterior, extending into concha media; C.med., concha media (cut surface); C.sup., concha superior; C.supr.I., concha suprema I; S.sph., sinus sphenoidalis; Hypoph., hypophysis; Sept.sph., septum sphenoidale (anterior portion); Ton.phar., tonsilla pharyngea; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; Ost.max.acces., ostium maxillare accessorium; C.inf., concha inferior; Proc.unc., processus uncinatus; B.eth., bulla ethmoidalis; Ag.na., agger nasi; Cel.infund., cellula infundibularis.

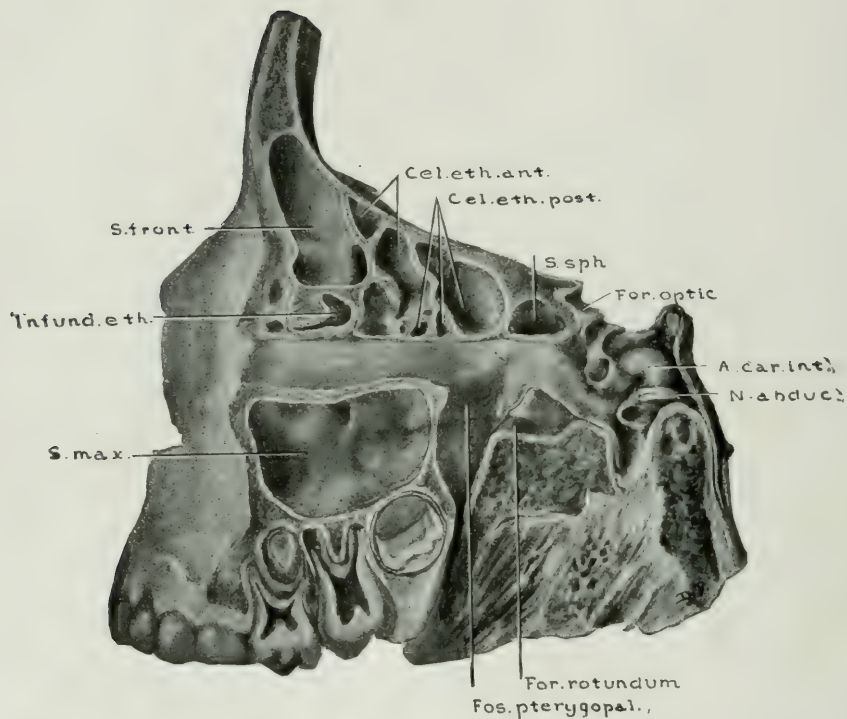


Fig. 11.—Specimen From a Child Five Years, Ten Months and Twenty-two Days Old. Lateral View of Frontal, Ethmoidal, Sphenoidal, and Maxillary Areas to Show the Extent of Pneumatization Present and the Relations of the Sinuses. (Series D, No. 45.)

Osseous wall, between sinus sphenoidalis and fossa pterygopalatina, is $\frac{1}{2}$ mm. thick, while from sinus cavity to foramen rotundum is 1 mm. Sinus frontalis developed from an infundibular cell. Cel.eth.ant., Cellulæ ethmoidales anterior; Cel.eth.post., cellulæ ethmoidales posterior; S.sph., sinus sphenoidalis; For.optic., foramen opticum; A.car.int., arteria carotis interna; N.abduc., nervus abducens; For.rotundum, foramen rotundum; Fos.pteryopal., fossa pterygopalatina; S.max., sinus maxillaris; Infund.eth., infundibulum ethmoidale; S.front., sinus frontalis.

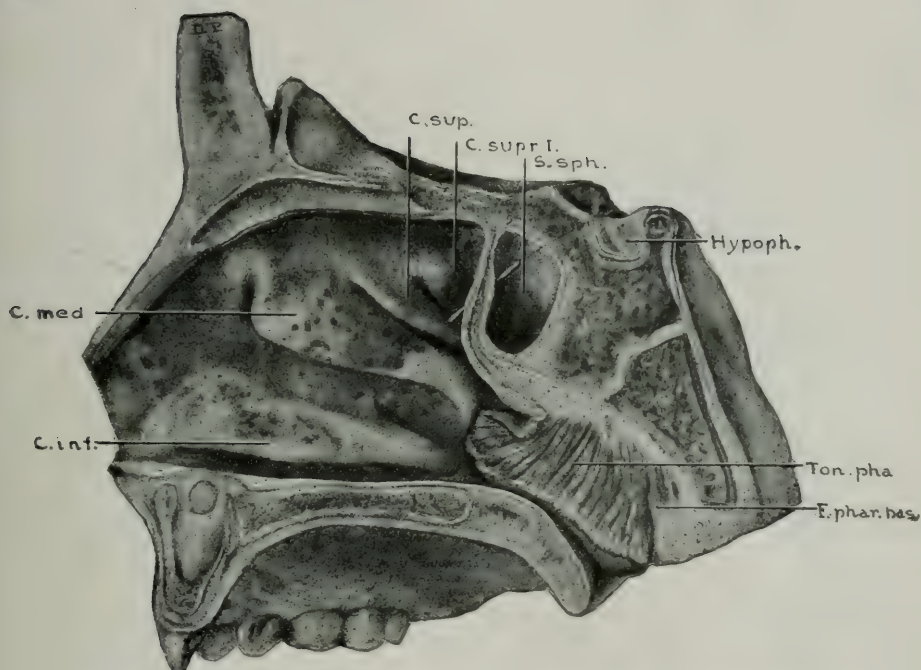


Fig. 12.—Specimen From a Child Six Years Old. Sagittal Section Showing Extent of Sphenoidal Pneumatization. (Series D, No. 46.)

The child from whom this specimen was taken died of nasal diphtheria. Note areas of submucous hemorrhages. The nasal cavities were completely filled with pseudomembrane, as were also the frontal sinuses and ethmoidal cells, while the maxillary and sphenoidal sinuses were approximately half filled. Also note the enormous tonsilla pharyngea, which nearly fills the posterior naris. (C.sup., Concha superior; C.supr.I, concha suprema I; S.sph., sinus sphenoidalis; Hypoph., hypophysis; Ton.phar., tonsilla pharyngea; F.phar.bas., fascia pharyngobasilaris; C.inf., concha inferior; C.med., concha media.

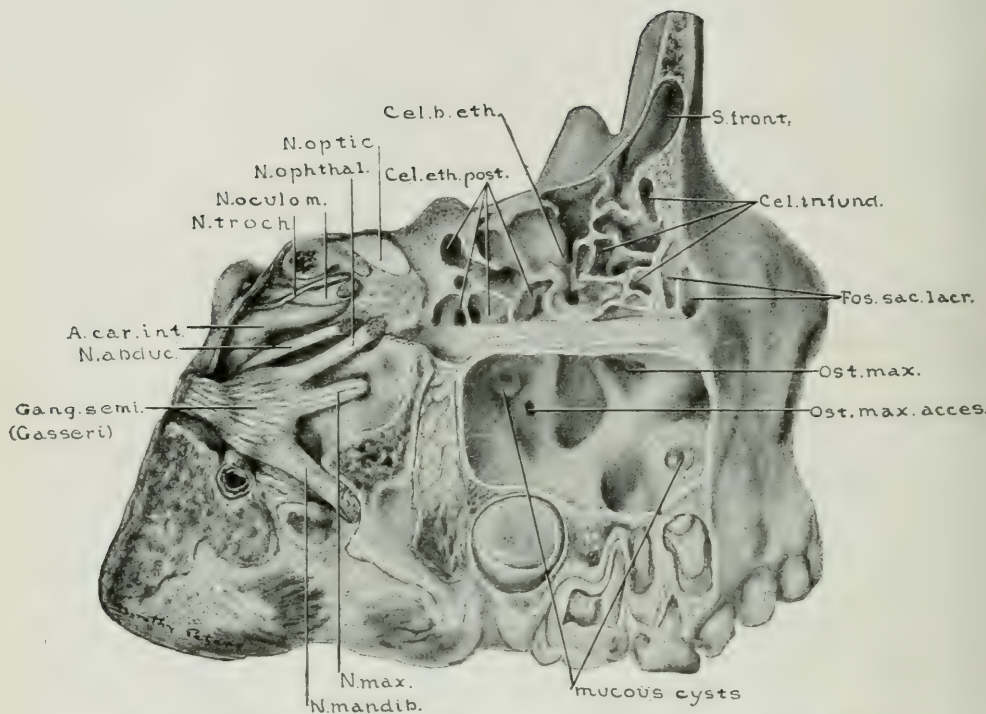


Fig. 13.—Specimen From a Child Six Years, Ten Months and Twenty Days Old. By Sagittal Sections the Lateral Portions of the Frontal, Ethmoidal, and Maxillary Areas Have Been Removed. (Series D, No. 53.)

The osseous ridges on the media wall of the sinus maxillaris are unusually prominent. The largest one overlies the ductus nasolacrimalis. There were two lacrimal sacs present, the superior portion of the duct being bifid. Note presence of ostium maxillare accessorium and the proximity of the mucous cyst. S.front., Sinus frontalis; Cel.infund., cellulae infundibulares; Fos.sac.lacr., fossae sacca lacrimales; Ost.max., ostium maxillare; Ost.max.acces., ostium maxillare accessorium; N.max., nervus maxillaris; N.mandib., nervus mandibularis; Gang.semi., ganglion semilunare (Gasseri); N.abduc., nervus abducens; A.car.int., arteria carotis interna; N.trochl., nervus trochlearis; N.oculom., nervus oculomotorius; N.opthal., nervus ophthalmicus; N.optic., nervus opticus; Cel.eth.post., cellulae ethmoidales posterior; Cel.b.eth., cellula bullae ethmoidalis.

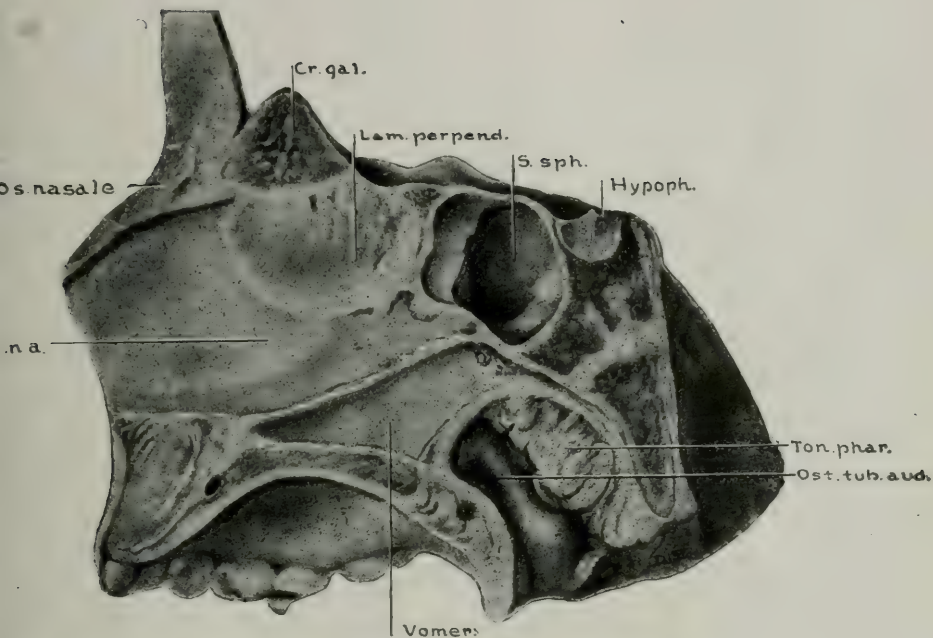


Fig. 14.—Specimen From a Child Six Years, Ten Months and Twenty Days Old. Lateral View of This Specimen Is Shown in Fig. 30. (Series D, No. 53.)

Sagittal section $\frac{1}{2}$ mm. to the left of median line, showing extent of sinus sphenoidalis and also the relation of the structures entering into the formation of the septum nasi. Cr.gal., Crista galli; Lam.perpend., lamina perpendicularis; S.sph., sinus sphenoidalis; Hypoph., hypophysis; Ton.phar., tonsilla pharyngea; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; Cart.sept.na., cartilago septi nasi.

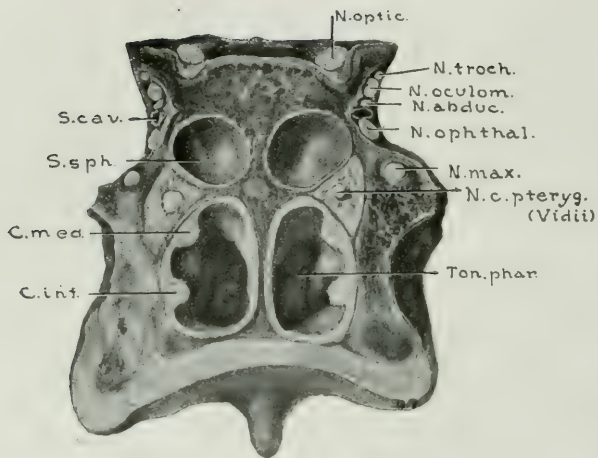


Fig. 15.—Specimen From a Child Seven Years, Nine Months and Twelve Days Old. (Series D, No. 58.)

Coronal section through the anterior portion of the body of the sphenoid bone, to show the relations of the cranial nerves to the sphenoidal area. The sphenoidal sinuses in this specimen show less extensive pneumatization of the body of the sphenoid than is usually seen at this age. N.optic., Nervus opticus; N.troch., nervus trochlearis; N.oculom., nervus oculomotorius; N.abduc., nervus abducens; N.ophtal., nervus ophthalmicus; N.max., nervus maxillaris; N.c.pteryg., nervus canalis pterygoidei (Vidii); Ton.phar., tonsilla pharyngea; C.inf., concha inferior; C.med., concha media; S.sph., sinus sphenoidalis; S.cav., sinus cavernosus.

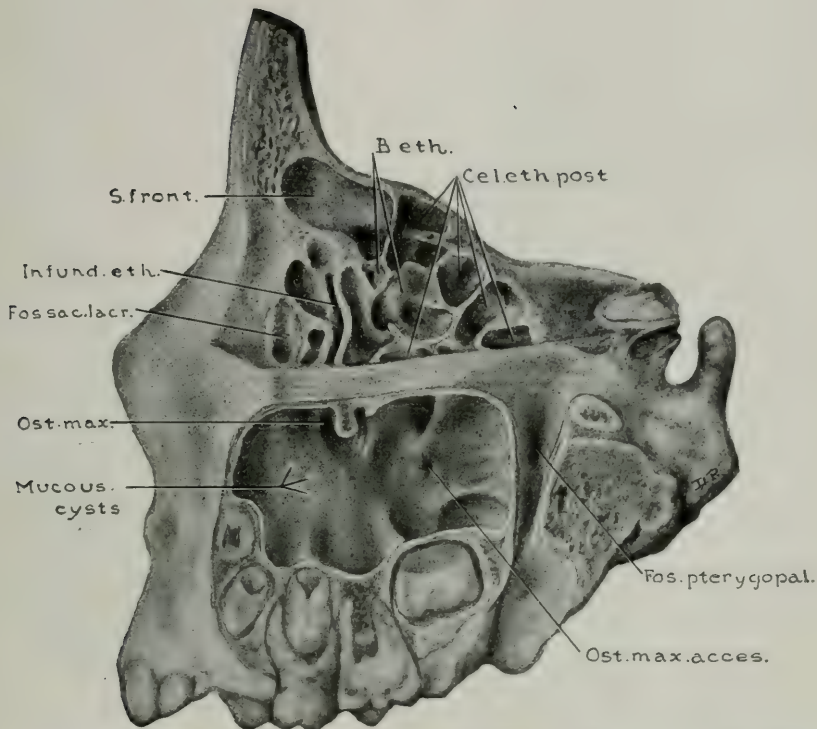


Fig. 16.—Specimen From a Child Eight Years, Two Months and Ten Days Old. (Series D, No. 59.)

Lateral view of frontal, ethmoidal and maxillary areas. Note that the sinus frontalis developed from a cell having its origin from the supra-bullar furrow. The right sinus frontalis had a similar origin, these two being the only such instances found in the entire series. The superoinferior extent of the cellulae ethmoidales is in this case greater than usually found at this age. B.eth., Cellulae bullae ethmoidales; Cel.eth.post., cellulae ethmoidales posterior; Fos.pterygopal., fossa pterygopalatina; Ost.max.acces., ostium maxillare accessorium; Ost.max., ostium maxillare; Fos.sac.lacr., fossa sacci lacrimalis; Infund.eth., infundibulum ethmoidale; S.front., sinus frontalis.

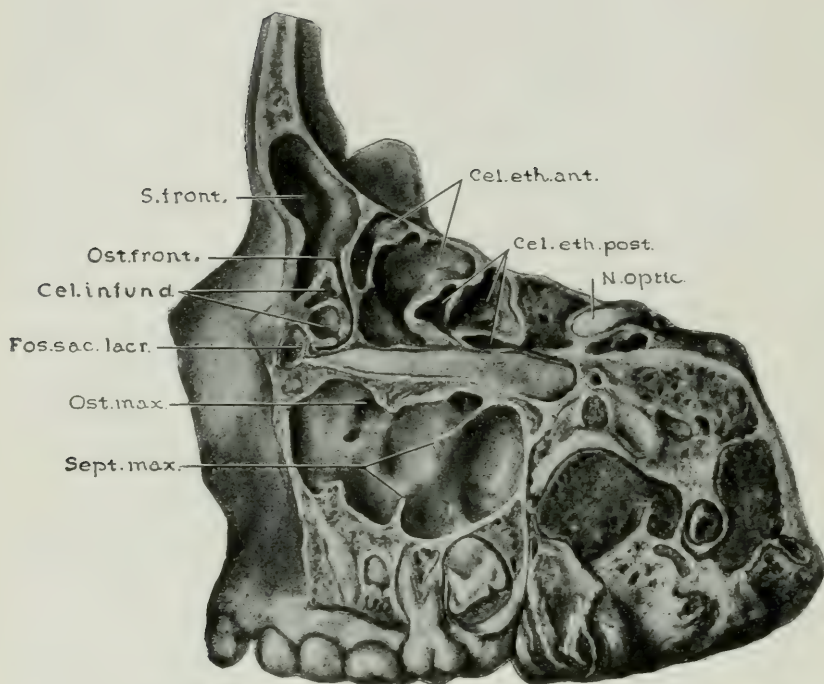


Fig. 17.—Specimen From a Child Eight Years, Eight Months and One Day Old. (Series D, No. 63.)

Lateral view of frontal, ethmoidal and maxillary sinus areas, the lateral portion of each having been removed by sagittal cuts. Note that the sinus frontalis developed directly from the infundibulum ethmoidale. Note also the incomplete septa in the sinus maxillaris. Cel.eth.ant., Cellulæ ethmoidales anterior; Cel.eth.post., cellulæ ethmoidales posterior; N.optic., nervus opticus; Sept.max., septulæ maxillares; Ost.max., ostium maxillare; Fos.sac.lacr., Fossa sacci lacrimalis; Cel.infund., cellulæ infundibulares; Ost.front., ostium frontale; S.front., sinus frontalis.

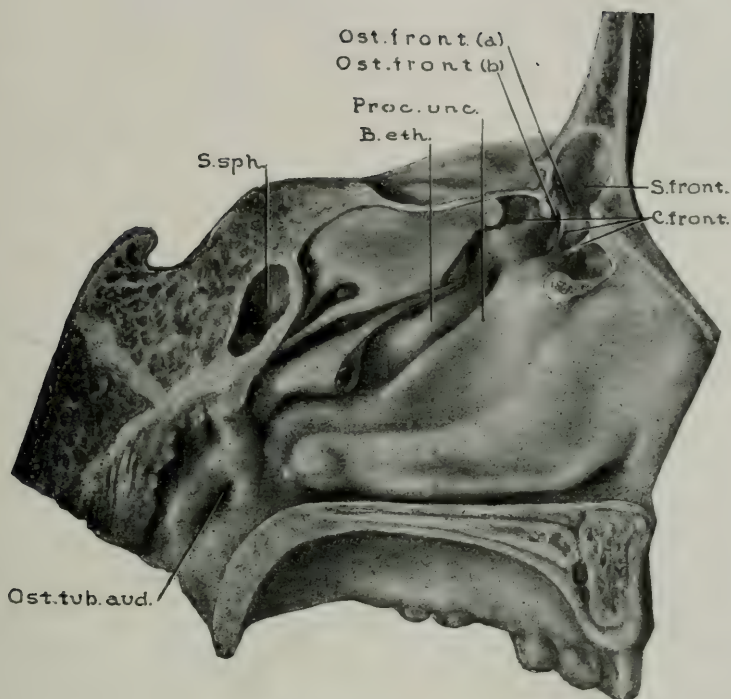


Fig. 18.—Specimen From a Child Nine Years, One Month and Nine Days Old. (Series D, No. 64.)

Incision through maxilla is $\frac{1}{2}$ mm. to the right of median line; in the frontal region 1 mm. to the left, and through the body of the sphenoid is 5 mm. to the left of median line. The anterior portion of the concha media and a small portion of the frontal bone have been removed to show the structures entering into the formation of the lateral nasal wall, and also the location of the ostia frontalia. In this case there are three sinus frontales—one in the right side and the two in the left side here illustrated. Of the more lateral sinus frontalis, only the ostium is shown (Ost. front. (b)); the sinus, however, extends to the same height as the medial one shown in the illustration. Note that neither ostium comes into direct relation to the infundibulum ethmoidale. In the suprabullar furrow ostia of bullar cells are shown. S.front., Sinus frontalis; C.front., conchæ frontales; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; S.sph., sinus sphenoidalis; B.eth., bulla ethmoidalis; Proc.unc., processus uncinatus; Ost.front. (b), ostium of the lateral sinus frontalis; Ost.front. (a), ostium of the medial sinus frontalis.

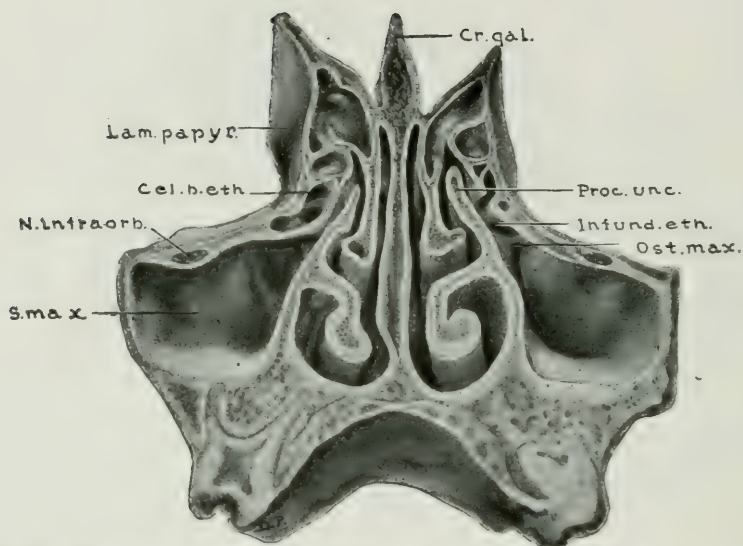


Fig. 19.—Specimen From a Child Nine Years, Ten Months and Nineteen Days Old. (Series D, No. 65.)

Anterior view of coronal section, cut 20 mm. posterior to the nasion, showing the size and relations of the sinus maxillaris, the ostium maxillare, and its manner of communication with the infundibulum ethmoidale, the bulla ethmoidalis, processus uncinatus, and cellulae ethmoidales anterior. Cr.gal., Crista galli; Proc.unc., processus uncinatus; Infund.eth., infundibulum ethmoidale; Ost.max., ostium maxillare; S.max., sinus maxillaris; N.infraorb., nervus infraorbitalis; Cel.b.eth., cellula bulla ethmoidalis; Lam.papyr., lamina papyracea. a

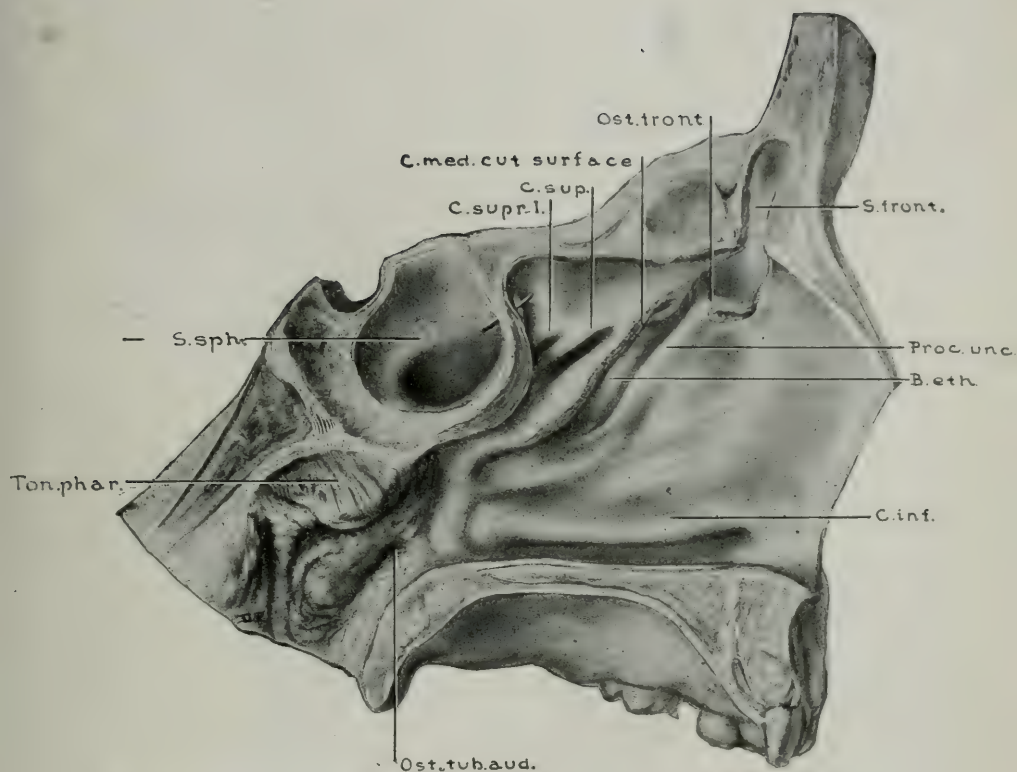


Fig. 20.—Specimen From a Child Ten Years, One Month and Seven Days Old. (Series D, No. 66.)

Sagittal section 1 mm. to the left of the median line. The anterior portion of the concha media and a portion of the medial wall of the sinus frontalis have been removed. Note that sphenoidal pneumatization has extended beneath the anterior portion of the sella turcica. S.front., Sinus frontalis; Proc.unc., processus uncinatus; B.eth., bulla ethmoidalis; C.inf., concha inferior; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; Ton.phar., tonsilla pharyngea; S.sph., sinus sphenoidalis; C.supr.I., concha suprema I; C.sup., concha superior; C.med., concha media; Ost.front., ostium frontale.

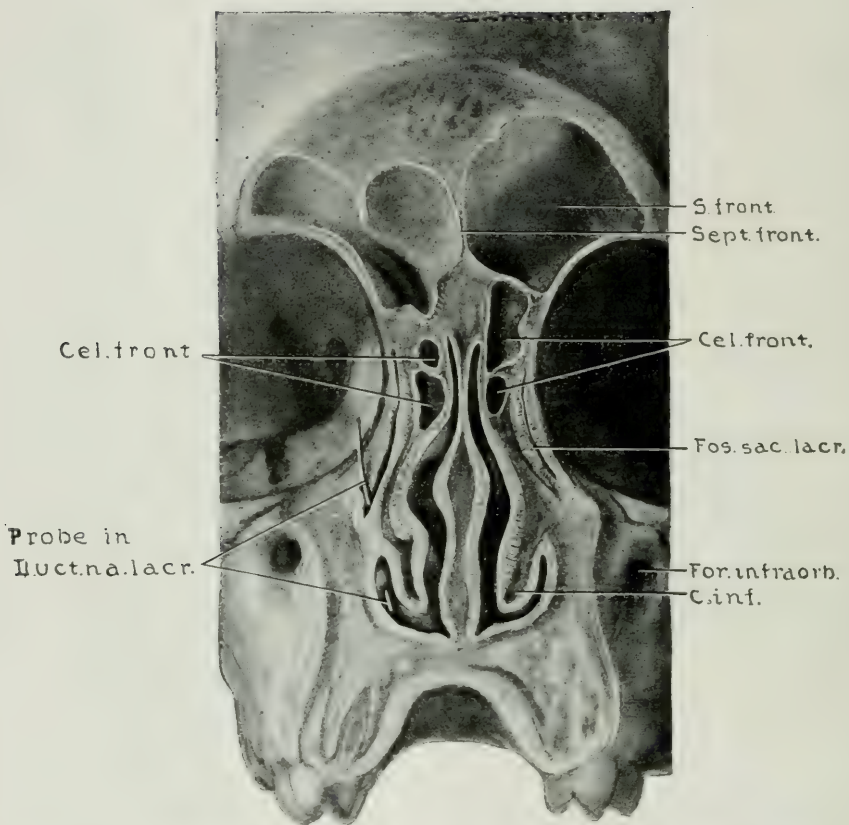


Fig. 21.—Specimen From a Child Twelve Years, Nine Months and Twelve Days Old. (Series D, No. 69.)

Anterior view of a coronal section cut 12 mm. posterior to the nasion, to show superior and lateral extent of the sinus frontales, also the relations of the cellulae frontales. The frontal sinuses and all cells shown in this illustration have their ostia medial to the uncinate processes. Note the relations of the ductus nasolacrimalis. S.front., Sinus frontalis; Sept.front., septum frontale; Cel.front., cellulae frontales; Fos.sac.lacr., fossa sacci lacrimalis; For.infraorb., foramen infraorbitale; Duct.na.lacr., ductus nasolacrimalis.

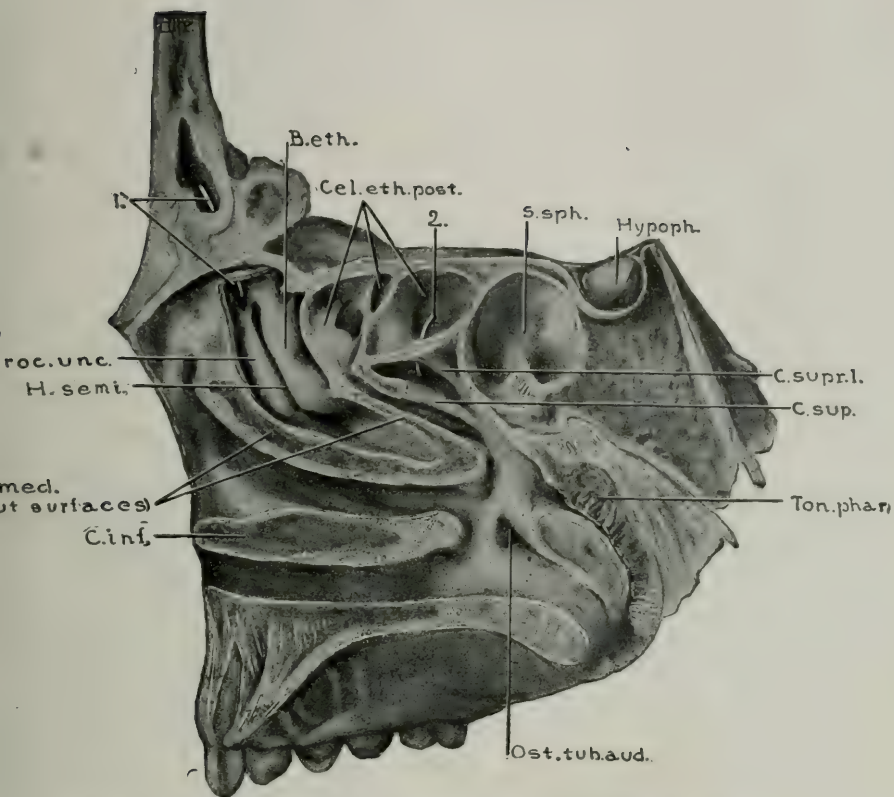


Fig. 22.—Specimen Fourteen Years and Seven Months Old.
(Series D, No. 73.)

Sagittal section, cut 4 mm. to the right of the median line, thus removing the medial portions of the concha inferior and concha media, and the medial anterosuperior portions of the concha superior and concha suprema I. The relations of the structures forming the lateral nasal wall and the positions of the ostia of the cellulæ ethmoidales are thus clearly shown. 1, Probe through ostium frontale; B.eth., bulla ethmoidalis; Cel.eth.post., cellulæ ethmoidales posterior; 2, probe through ostium of most posterior ethmoidal cell; S.sph., sinus sphenoidalis; Hypoph., hypophysis; C.supr.I, concha suprema I; C.sup., concha superior; Ton.phar., tonsilla pharyngea; Ost.tub.aud., ostium pharyngeum tubæ auditivæ; C.inf., concha inferior; C.med., concha media; H.semi., hiatus semilunaris; Proc.unc., processus uncinatus.

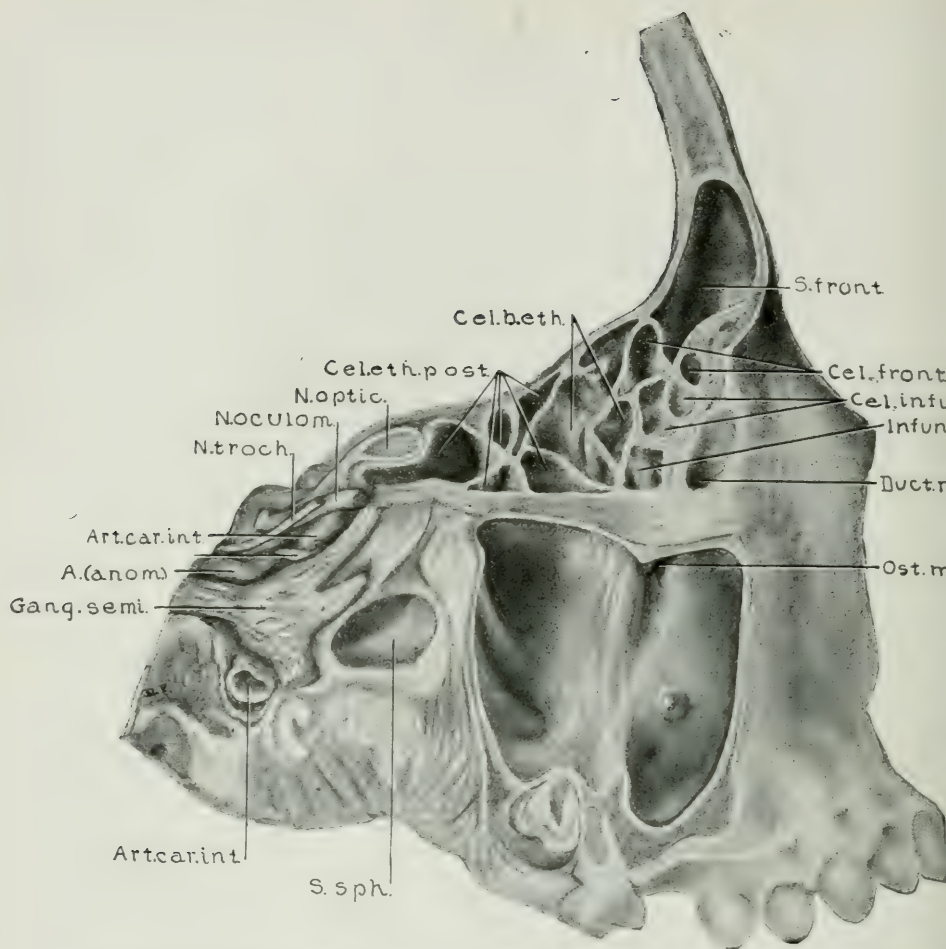


Fig. 23.—Specimen Fifteen Years, Nine Months and Twenty-six Days Old.
(Series D, No. 76.)

Lateral portions of the frontal, ethmoidal, maxillary and sphenoidal areas have been removed by sagittal incisions. Note the marked extent of the sinus sphenoidalis into the pterygoid process. The ridge which is seen on the floor of the sinus sphenoidalis overlies the nervus canalis pterygoidei (Vidii). The sinus maxillaris extends 11 mm. below the level of the nasal floor. S.front., Sinus frontalis; Cel.front., cellulae frontales; Cel.infund., cellulae infundibulares; Infund.eth., infundibulum ethmoidale; Duct.na.lacr., ductus nasolacrimalis; Ost.max., ostium maxillare; S.sph., the portion of sinus sphenoidalis extending into the pterygoid area; Art.car.int., arteria carotis interna; Gang.semi., ganglion semilunare; A.anom., anomalous branch of carotid artery; N.troch., nervus trochlearis; N.oculom., nervus oculomotorius; N.optic., nervus opticus; Cel.eth.post., cellulae ethmoidales posterior; Cel.b.eth., cellulae bullae ethmoidales.

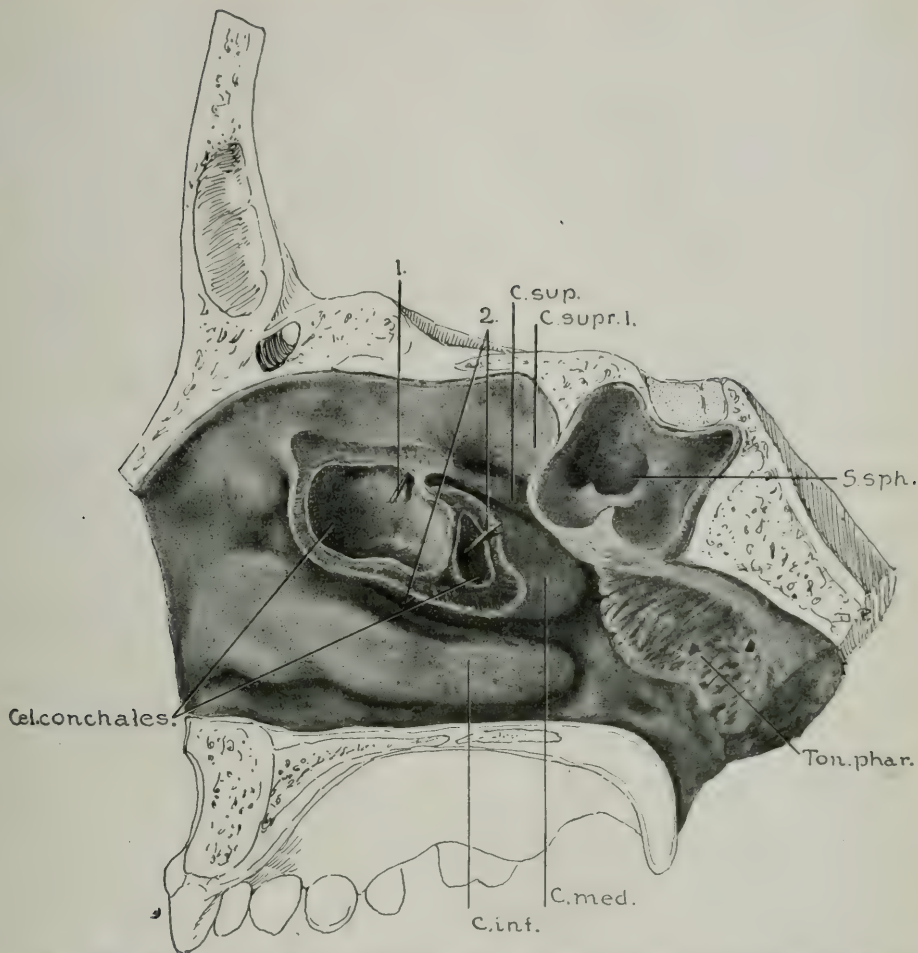


Fig. 24.—Specimen Fifteen Years, Nine Months and Twenty-six Days Old.
(Series D, No. 76.)

Lateral view of this specimen is shown in Fig. 45. Sagittal section, showing the sinus sphenoidalis and a portion of the lateral nasal wall. There was in this case a marked deviation of the septum nasi toward the left, and a compensatory increase in the size of the concha media. Note the presence of the cellulæ chonchales. The anterior conchal cell has its origin as an extension from a posterior ethmoidal cell, just anterior to the superior meatus, while the posterior conchal cell developed from the posterior portion of the suprabullar furrow. 1. Probe through ostium of the anterior conchal cell; 2, probe through ostium of the posterior conchal cell; C.sup., concha superior; C.supr.I, concha suprema I; S.sph., sinus sphenoidalis; Ton. phar., tonsilla pharyngea; C.med., concha media; C.inf., concha inferior; Cel.conchales, cellulæ conchales.

LVI.

THE SPANISH GRIPPE IN SWITZERLAND.

BY J. HOLINGER, M. D.,

CHICAGO.

Since June, 1918, a serious epidemic of the "Spanish grippé" has been raging in Switzerland. The following points taken from a paper edited by a nephew of the writer may be of interest:

The infection travels from person to person. Complications, pneumonia, nephritis, meningitis, are very frequent and very serious. Young and strong people, from eighteen to thirty-five years of age, are most frequently attacked. Its contagiousness is well shown by the following: A small number of men gathered together at a meeting in a village. One of them was beginning to feel ill. He infected seven of them; three died. In another village there were four deaths in one house. Physicians and nurses were everywhere among the first to contract the disease.

The symptoms appear rather suddenly. They are dizziness, headache, pain in different parts of the body, fever, the well known nose and nasopharyngeal symptoms—malaise combined with a feeling of extreme weakness. People on the street, soldiers on the march, were overcome and had to be carried away.

The diagnosis, on account of the epidemic character of the disease, is not difficult.

The course is recovery after three to five days, if no complications set in. The complications are bronchopneumonia, often double sided, nephritis, and meningitis may appear, early or late.

The influenza bacillus was positively identified as the cause of the disease.

The treatment is mainly symptomatic: Rest in bed, calomel, salicylates, aspirin, salipyrin. Prompt results were reported from intravenous injections of neosalvarsan, which is even considered a specific.

The prophylaxis is discussed in articles and pamphlets issued by the government and local health authorities. Smoking and alcohol offer no protection. Cleanliness of the mouth and nose and open bowels are necessary. The first is accomplished by frequent rinsing of the mouth and gargling with water containing one to two tablespoonsful of hydrogen peroxid to a glass of water. The nose is douched with lukewarm water with a teaspoonful of table salt to a glass. In many towns the streets were sprinkled with antiseptic solutions. In some places all gatherings of people were prohibited; the schools, churches, theaters were closed. Unnecessary traveling is discouraged, especially for patients and convalescents, since complications are so much more frequent, and the infection may be spread. The hospitals were so overcrowded that many had to be closed, and schoolhouses and other public buildings used for taking care of the sick. Emergency barracks had to be erected. The Red Cross, which has been carefully organized in every town and hamlet for more than thirty-five years, was of enormous benefit. A gift of one hundred thousand dollars from the American Red Cross to the Swiss Red Cross to alleviate the suffering is mentioned with special gratitude.

LVII.

TWO CASES OF SINUS THROMBOSIS WHICH PRESENTED UNUSUAL DIFFICULTIES IN DIAGNOSIS.*

By E. ROSS FAULKNER, M. D.,

NEW YORK.

Case 1.—I saw this boy first, April 15th, with another physician at his office. He had then a profuse purulent discharge from his left ear. For two weeks he had had this condition accompanied by considerable pain. He was going to the physician's office for observation and was carrying out irrigation at home.

Three years previous to this, he had had an acute otitis media in the same ear which had entirely cleared up. At that time he looked rather ill, but he had always been delicate looking. Two myringotomies had been performed and drainage was free. He had had no chills and no marked tenderness over the mastoid region. On April 21st, the physician told me that he was sending him to the hospital under my care. When I saw him, after admission, his temperature was 100.4° and pulse 82. There was no discharge from the ear and no tenderness on deep palpation in the mastoid region. He looked more ill than the local symptoms would warrant. Later in the day his temperature went up to 104.8°. A myringotomy was performed by the house surgeon. The next morning the temperature was down to 102°, later on, however, going up to 106°, accompanied by very severe headache. He was seen by several of my colleagues at the hospital, and although there was not much to be seen in the middle ear, I decided to open his mastoid. I did quite an extensive simple mastoid, but found nothing to account for the symptoms. On exposure the dura and sinus looked healthy—in fact, the appearance of the mastoid was that of one undergoing resolution. His blood count had given no

*Read before the New York Academy of Medicine, Section on Otolaryngology, May 10, 1918.

positive evidence, there being a slight leucocytosis with about 78 per cent of polynuclears. The blood culture was taken on the day of the operation, April 23rd. The night after the operation he had severe pain in the right shoulder. The next day this was slightly swollen and immobilized. In the afternoon his temperature went up again to 104.4°; dressing showed no pus either from the wound or from the middle ear. The following day the report from the blood culture showed the presence of *streptococcus viridans*.

The physical examination by the medical attendant, Dr. Howe, showed lungs negative, a slight systolic murmur at the apex of the heart, but this was not considered due to endocarditis. At this period, therefore, there were clinically a pyemic temperature, with pulse rate usually under 100, the mastoid to all appearances undergoing resolution, apparently an embolic process in the right shoulder, with *streptococcus viridans* in the blood. It was most improbable that the focus of origin was in the ear. In fact, so far as I knew, no case of *streptococcus viridans* in the blood had been reported with a primary focus in the ear.

Dr. Dwyer, the pathologist, substantiated this view. The patient's teeth and tonsils were both badly infected, and, as either of these are more likely the habitat of the *streptococcus viridans*, we took cultures from both these regions, but found only diplococci present. For the next four days the patient had a pyemic temperature with a constant daily rise to 104 or 105 degrees, with remissions in the morning down to 100 or 101 degrees. There were no chills, and the pulse rate ranged from 84 to 108, most of the time below 100. The case was in the meantime subject to much consultation, and I could hardly mention the number of otologists who saw him, some advising operation and some against it.

With the *streptococcus viridans* in his blood, operation seemed hopeless, besides it was most unlikely that the blood infection could have come from the ear. On the other hand, it was argued that if he were going to die anyway, he should be given the odd chance of exploring his sinus. To this I agreed without much hope for ultimate good.

On exposing the sinus from the bend downward, the wall appeared quite healthy. However, I kept on going toward

the bulb. Suddenly, to my surprise, pus began to well up in considerable quantities. A perisinus abscess had been tapped around the bulb. The jugular was ligated and the bulb cleared of the clot. The culture from the pus in this region showed streptococcus hemolyticus.

The patient's temperature came down by a step-like process in the next week. His ear entirely cleared up and he has remained well ever since.

Case 2.—This patient was first seen September 28, 1917. He came to the clinic with a very severe pain over his right eye and looked very ill.

Since an attack of whooping cough in childhood, he had had a periodical discharge from his right ear. Three weeks before admission, his ear began discharging, and he had had severe pain in the right frontal region, varying in intensity at different times of the day. Up to that time there had been no pain in the ear. He had been treated in another hospital, and an operation on his ear had been discussed. On admission there was no evidence of any discharge, but there was a large perforation in the drum membrane, with no pain or tenderness over the mastoid. What pain he had was all located in the right frontal region. His hearing was markedly impaired on that side.

For the past week he said he had had a severe chill every day but not recurring at the same time of the day. The patient was X-rayed, both frontal and mastoid regions, but nothing was found. Shortly after admission, he had a chill and his temperature went up to 105° . The next two days he had a daily rise to about 104° with chills at less than twenty-four hour intervals between these daily rises.

I advised operation but patient refused. He thought he had malaria. This seemed, of course, possible. With the entire absence of local ear symptoms, we were inclined to eliminate every other possible cause. One aurist, for whose opinion I have a great respect, said that he would want to give the ear the last consideration as the cause of the phenomenon. Repeated examinations for malaris were negative; the possibility of pyelitis was eliminated; lungs and heart were negative; blood count showed 77 per cent of polynuclears, but this did not tell us much; blood culture was negative.

On the fourth day his temperature remained down and he had no chill. The fifth day, October 2nd, there were two sharp upward variations, the last one accompanied by severe chill and reaching 106.8° . Such a phenomenon with a double rise of temperature in twenty-four hours, I believe to be pathognomonic of a pyemic process and nothing else. Moreover, it is significant of absorption into a large vein, such as the jugular or uterine veins. I was now fairly certain that he must have a sinus thrombosis, although there were still no localizing symptoms in the ear or neck, and the pain was still confined to the frontal region. The patient's consent for operation was now obtained, October 4th, and the operation performed on the following day. The sinus wall above near the bend looked suspicious only, but on following it down it appeared thickened and of a grayish color. There was no perisinus abscess or granulations on the surface. I put in some compression plugs at each end of the exposure. I then ligated the jugular above the facial. There was no evidence of disease of the jugular. A free incision into the exposed sinus liberated liquid pus with free bleeding from the torcular end. This end was packed and a portion nearer the bulb opened further. A little more pus was obtained. The exposure was now down to the bulb. Very free bleeding occurred, probably from the inferior petrosal. This was packed off and dressing applied, and the patient returned to the ward. The temperature remained down until the fourth day, when it went up to 105° . All packing was then removed and a small quantity of pus was seen coming from the region of the bulb. The packing was loosely inserted in this region and changed daily, considerable pus being present at each dressing.

From that time on, his recovery was uninterrupted. A radical mastoid was performed five weeks later.

LVIII.

LEUCOCYTOSIS OF THE SPINAL FLUID IN THE DIAGNOSIS OF MENINGITIS.*

BY CHAS. E. PERKINS, M. D.,

NEW YORK.

I desire to present a few observations and refer to several cases bearing upon the value of the count, numerical and differential, of the spinal fluid cells, as furnishing evidence in the diagnosis and management of various complications of purulent otitis media.

The spinal fluid normally contains somewhat under ten cells to the cubic millimeter, and these are lymphocytes with perhaps an occasional endothelial cell. There should be no polymorphonuclears. A rather large number of diseases are capable of increasing the number and changing the character of these cells. Nevertheless, when, following a purulent middle ear process, one has clinical evidence or has reason to expect meningeal involvement, the change in the kind and number of leucocytes of the fluid obtained by lumbar puncture, in conjunction with certain chemical tests, affords one valuable evidence. In such cases, however, one seldom, if syphilis is excluded, will make a mistake in attributing the leucocytosis to the process complicating the otitis media.

Considered from an otologic standpoint, the presence of an increased leucocyte count with a substantial polymorphonuclear percentage, indicates that an inflammation exists either within the meninges themselves or in their immediate proximity.

It is evident that if the subdural space has become generally infected one of the products of inflammation—that is, pus—will be found in the cerebrospinal fluid. In the first stages the cell count will be low and will more or less rapidly mount, until as death approaches it may be well into the thousands. The polymorphonuclear percentage also increases

*Read before the New York Academy of Medicine, Section on Otology, May 10, 1918.

to above 90 per cent in some instances. If, however, the process becomes circumscribed, the cell count will not mount so rapidly unless the barrier adhesions give way and the process becomes general. The fact that the meningitis can become circumscribed, although quite extensive, accounts for some reported instances of death from meningitis, verified postmortem, with normal spinal fluid. Thus the process has been sufficiently extensive to result in a fatal termination from changes in the brain cortex, absorption of toxins, etc., without extending to the spinal system or allowing the products of inflammation to reach the lumbar enlargement.

In the other group of cases, the inflammatory process is in immediate proximity to the cerebrospinal spaces, which may not be invaded by bacteria. Leucocytes may migrate into the spinal fluid as they do into the tissues in the neighborhood of any severe inflammation. This explanation I believe accounts satisfactorily for many of the cases of so-called serous meningitis which we observe. As the serum also finds its way along with the white blood cells into the cerebrospinal fluid, it is customary to find in these patients a positive serum globulin test. As instances of processes which may bring about this condition may be mentioned brain abscess, extradural abscess, sinus thrombosis and labyrinthitis.

In brain abscess the increase in cells and amount of cerebrospinal fluid is undoubtedly often caused by the approach of the abscess cavity to the cerebral cortex. This allows the migration of white blood cells and transudation of serum into the cerebrospinal spaces. This will especially occur in noncapsulated abscesses, and in those in which there are no limiting meningeal adhesions. In abscesses of the brain substance other factors doubtless may be responsible for the leucocytosis and increase of spinal fluid. If the abscess approaches the lateral ventricle, and all located in the temporo-sphenoidal lobe are almost of necessity in proximity to the ventricle, the above process may affect primarily the fluid within this cavity, and secondarily, the general cerebrospinal fluid through the canal system of the ventricles. That is, from the lateral through the foramen of Monro to the third, the aqueduct of Sylvius, to the fourth, and out through the foramen of Majendie. Moreover, it is not at all impossible that

the abscess itself may produce an effect upon the choroid plexus in the ventricle of the side involved, and as these structures are generally recognized as being connected with the production of the cerebrospinal fluid, it is in no way unreasonable to suppose that this sort of involvement of the ependyma might result certainly in the increase of the fluid, perhaps also in the amount of its cellular constituent.

In connection with the canal system of the ventricles, a fact may be called to your attention which is not at all new, and that is that a cerebellar abscess may cause sufficient pressure upon the posterior part of this system to prevent the drainage of the lateral ventricles, thus producing a sort of internal hydrocephalus. In one patient, in whom the symptoms were obscure but evidently pointed to a brain abscess, exploration of the temporosphenoidal lobe gave exit to fluid under marked pressure, the ventricle being entered at much less depth than normal. This led to the recognition of the location of the primary process and the evacuation of a cerebellar abscess.

In inflammation adjacent to and involving the external layers of the dura, which later extends to the meninges, there is often no doubt a stage of varying length, while the products of inflammation are escaping into the subdural space, which antedates the invasion of this space by the bacteria causing the process. In this stage there may be found in the spinal fluid the serum globulins in abnormal amount, or besides these an increased leucocytosis. Meningitis recognized in this stage responds to treatment. A case among several in illustration may be cited:

The patient, a girl about seven years of age, was under the care of Dr. Bowers, at St. Luke's Hospital. She had symptoms of meningitis with spinal fluid showing a cell count well into the thousands to the cubic millimeter. A mastoid operation with the evacuation of a large extradural abscess resulted in recovery. If, in these patients, after evacuating the extradural abscess, there is no improvement after twenty-four or forty-eight hours, and especially if the spinal fluid culture should be positive, incision of the dura doubtless offers the best prospect of any interference.

As illustrating the effect of an infective focus in the venous sinuses, I may allude to a case of Dr. Kahn's, which was

reported before this section last winter, and which, so far as I know, is unique.

The patient, an adult male, had a mastoid operation and jugular resection. The sinus was explored, free bleeding obtained from below, but the upper end for some reason was not interfered with, leaving this clot in situ. He did very well for three or four days, when symptoms of meningitis developed—headache, delirium, fever, etc. The spinal fluid taken at that time was reported upon by Dr. Dixon as follows: "Spinal fluid, pus," so great was the number of leucocytes, and yet this patient made a complete recovery upon removing the clot which had been left in the torcular end of the sinus. Notwithstanding this apparent exception, I believe it is a rule that the greater the cell count and the higher the polymorphonuclear percentage, the more serious is the condition. The exception in this case was perhaps due to the thinness of the internal wall of the sinus, which allowed the migration of leucocytes in enormous numbers. Why bacteria did not also escape and institute a general meningitis seems to be a stroke of fate, fortunately of the beneficent kind.

The labyrinth, as is well known, offers the most frequently traveled route for infection to pass from the middle ear to the meninges. The question naturally arises if there may not be, in many instances, a period after the development of a purulent labyrinthitis and before general bacterial invasion of the meninges, when the spinal fluid will show the imminence of this occurrence. If so, it would be of paramount importance from the standpoint of treatment, as it represents the latest point of time in which we can reasonably hope that operative interference will be successful. I do not wish to be understood to advise postponement of the labyrinth operation until there is a leucocytosis of the spinal fluid. But if one chooses to adopt the so-called "conservative" treatment of purulent labyrinthitis, in the hope that it will pass into the latent stage and cause no more trouble, one surely should not wait after the spinal fluid begins to show changes, although to be fair I will later refer to a case pointing otherwise. First, however, I desire to refer briefly to two

cases bearing upon the leucocytosis associated with labyrinthitis:

An adult male, upon whom I performed a radical operation, developed purulent labyrinthitis on the following day, with total deafness, nystagmus, vertigo, etc. The spinal fluid taken fourteen hours after the onset of the vertigo and nystagmus, showed a cell count of 145, polymorphonuclear percentage above 60. Labyrinth operation with opening of the internal auditory meatus and removal of the modiolus was done a few hours later. The patient lived and is alive today after more than two years—a healthy man, although minus the function of one ear. The culture and complement fixation test for syphilis were both negative.

Another patient, whose case I propose to report in full later, had all of the symptoms of meningitis following a purulent labyrinthitis of about a month's standing. Examination of the spinal fluid showed 15 leucocytes, with a few polymorphonuclears. On the following day the laboratory report was 512 cells with polymorphonuclear percentage of about 60. Labyrinth operation and decompression cleared up the meningitis, although the patient died four months later with obscure symptoms of some intracranial lesion. His spinal fluid, however, remained normal to the end. I felt that my operation in these two patients was timely and well adapted to the requirements, and I still feel so, notwithstanding the following case:

The patient was under Dr. Kahn's care. Following a radical operation there developed a purulent labyrinthitis with an abnormally high cell count of the spinal fluid, with a substantial polymorphonuclear percentage, and although no operation was done the patient recovered. This case evidently shows that it is possible, even after the spinal fluid has shown a meningeal reaction to an offending labyrinth, for the process to become walled off by barrier adhesions and pass into a quiescent or latent stage. To postpone the operation of labyrinthectomy, expecting such an outcome in an instance of this kind, is the very absurdity of conservation.

We thus see that the leucocyte count of the spinal fluid is able to give us early information in a patient in whom we are fearing the onset of meningitis, and that at a time when treat-

ment of a surgical nature may be undertaken with a prospect of success. Whether or not the determination of the presence, number, or percentage of the polymorphonuclears alone would do this I am unable to say. I do know, however, that through many years the reports from the laboratory have come in the form of the total count, together with the polymorphonuclear percentage, and that I have found these reports very satisfactory and would not readily forego the information gained from the total count. From this, one forms an idea of the intensity of the process, and as the disease progresses the count offers a good, if not the best, indication of its favorable or unfavorable tendency. This does not hold true if fluid for the purposes of medication has been injected into the lumbar sac. Serum or other liquid preparations tend to dilute the spinal fluid, and on a subsequent puncture the leucocyte count may be less, although the disease is progressing favorably.

The report on the cells in conjunction with the result of the globulin test comes very soon after the fluid is withdrawn, and operation may be instituted without waiting twenty-four hours or more for the report of the culture, which may or may not be positive in a case of purulent meningitis.

I have had two patients, whose meningitis ran to a fatal termination, one confirmed by autopsy, the other with a typical history, in neither of whom did the spinal fluid give a positive culture, although numerous specimens from each were cultivated.

The greatest difficulty often arises in making a cell count of the spinal fluid that will be of value when there is admixture of blood. In an instance of this sort the test for the globulin is, of course, strongly positive, and one usually relies on the culture. Two instances in this connection may be mentioned.

In the first, the diagnosis of meningitis was verified by autopsy. Clinical history obscure. Blood in spinal fluid from three punctures made at intervals. Fehlings positive. Culture negative. Dr. Dixon thought the fluid obtained at the first puncture showed leucocytes out of proportion to the red blood cells as found in the patient's blood.

In the second, the patient was convalescing from meningitis when a temperature of 103° , with severe headache, influenced me to have the spinal fluid taken. Blood was drawn with the fluid. After comparing the differential count of the fluid with that of the patient's blood, I concluded that these symptoms were not caused by a recrudescence of the meningeal process, and subsequent progress of the case established the accuracy of this opinion.

In conclusion, I would say that one should always be on the lookout for other diseases which give a leucocytosis of the spinal fluid, especially syphilis in its various forms. All laboratory reports should be considered as aids to clinical observation. Viewed in this light, I regard the cell count of the spinal fluid, with the determination of the polymorphonuclear percentage, as one of the most important laboratory aids in the diagnosis and management of meningitis.

616 MADISON AVE.

LIX.

BENIGN NEOPLASMS OF THE NASAL SEPTUM.*

By G. W. MOSHER, M. D.,

CHICAGO.

While under the impression that benign new growths of the nasal cavities were not common, it was rather surprising to note that Hasslauer in an investigation in 1900 found less than 300 cases reported. Of these only 115 were true new growths, and 57 of this group were angiomas. The remaining 58 were classified as follows: Papillomata, 35; fibromata, 9; myxomata, 6; chondromata, 4; adenomata, 4. From the fact that no osteomata and but four ecchondromata were shown in this list, it must be assumed that the investigator was more than careful to rule out exostosis of the septum, as there have been a considerable number of true bony or cartilaginous tumors of the septum as well as papillomata, etc., reported since his article was written.

As to the etiology of these growths, Kyle apparently voices the best fortified opinion by saying that, like all benign tumors, they have no assignable cause for existence.

In contradistinction to malignant growths which most commonly occur in the regions about the outer wall of the nose, benign growths usually appear on the septum, and for some unknown reason show a predilection for the lower part of the septum.

The clinical reports of cases, as studied, showed as a rule, no distinctive subjective findings, the history being that of a unilateral nasal stenosis of a varying degree of rapidity of development. The concomitant symptoms, such as excess or altered secretion, hemorrhage, pain, local or referred, etc., were, as a rule, in no way diagnostic. The exceptions to the above statement included cases of angioma in which hemorrhage was the dominant characteristic, and fibromata, chiefly, of long standing where the growth attained such size that by pressure, deformities of the external nose or invasion of surrounding structures resulted.

In practically every case examination by inspection and by the probe rendered simple the determination of the character of the growth.

As with similar neoplasms elsewhere in the body, definite surgical procedures for removal have been more satisfactory than electrolysis, X-ray, radium, or cautery, either actual or chemical. The extent and character of the surgical intervention naturally varied with the size and nature of the tumor mass, and ranged from a simple snaring off of a pedunculated growth, with or without subsequent cauterization of the base, to a resection of the superior maxilla to give access to a growth of exceptional size involving other structures than the septum.

As concerns the septum borne growths, only simple measures were usually required. Practically no complications were reported except hemorrhage, and in the septal cases this had not been severe and had been controlled by pressure. Fibromata had apparently caused more trouble in this respect than had the other growths, except the purely vascular ones.

The relative frequency of recurrence in fibromata and adenomata should serve as a reminder of the narrow line of separation between benignancy and malignancy, and should impress on the operator the need of a thorough removal of all pathologic tissue.

The following is the history of another case in this category. Miss H. F., twenty-five years of age, seamstress, family and previous personal history negative. During the summer of 1915 she had done a great deal of swimming and diving, using no protection for the ears. In September, 1915, she began to notice a permanent sensation as of water in the right external auditory canal, a slight dullness of hearing on that side and, especially in damp weather, occasional sharp pains, darting in character, directed toward the nasopharynx. The amount of annoyance gradually increased until in December, 1915, she consulted her family physician, who ordered hot applications to the ear and some remedy internally for relief of pain. Receiving no benefit, she was referred to me in February, 1916. No nasal symptoms were volunteered, but on questioning she acknowledged a slight feeling of stuffiness in the right naris and occasional right frontal headache.

General health unimpaired. Examination showed a healthy, well nourished young woman, skin and mucous membranes good color, no external deformities of nose or auricles; pharynx and larynx, normal; external auditory canal and drum membranes, normal except slight retraction of right drum. Left naris, normal; right naris, I was unable to see past anterior end of inferior turbinate, the entire cavity being filled by a tumor mass. This mass was lobulated, fairly firm in consistency, covered with a normal, healthy mucous membrane with no signs of congestion, no ulceration, no abnormal secretion and not especially sensitive to manipulation. I was wholly unable to discover its point of origin, so anesthetized as best I could with 10 per cent cocain in 1/5,000 adrenalin, which had no apparent effect on the size of the mass, and removed the anterior portion with a snare. This enabled me to locate the pedicle low down on the septum and remove the rest of the growth intact. The loss of blood was practically nil. The pedicle was not more than one-eighth of an inch in diameter and was located one and one-fourth inches from the anterior nasal spine and one-fourth inch from the floor of the nose. The entire tumor mass was approximately one and one-fourth inches long, one to one and one-fourth inches in vertical measure, with an irregular transverse measurement because of the manner in which it had moulded itself about the turbinated bodies. The nasal mucous membrane showed no effect from the pressure of the growth except a slight pallor, and the turbinated bodies seemed somewhat atrophied.

I regret that through carelessness the gross specimen was lost, but sections had been made from which I had two slides prepared, showing that the growth should be classed as adenoma.

This patient has been seen several times since, the last time six months ago, and there was then no sign of a recurrence of the growth, and no return of the original symptoms.

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RADIUM IN DISEASES OF THE EAR.*

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The decade from 1895 to 1905 has been described by someone recently as the most remarkable in history for the number of great primary discoveries. It was near the beginning of this period (1898) that Professor and Madam Curie made the startling announcement to the scientific world of their discovery of a new metallic element which they called "radium" and gave a description of its wonderful powers. Since that time the element has been exhaustively studied and today we are fully acquainted with its physical properties.

Soon after its discovery the medical profession was attracted to it, and it has been tried in one form or another in the treatment of almost every ill to which the human flesh is heir.

In the field of otolaryngology it has been used chiefly in the treatment of diseases of the larynx, and Polyak, Killian, Abbe, Freudenthal, Coakley and the writer among others have employed it more or less extensively in that domain of medicine. So far as its employment in diseases of the ear is concerned, the literature is very scanty. Most of the work has been done by German otologists and is characterized by their usual thoroughness and care. These reports show that radium has been employed in the treatment of almost every form of ear disease during the past ten years. It has seemed to us that the present time is a fitting one to inquire what it has accomplished and just what we may fairly expect of it.

Properly to answer this question it is desirable that we should recall briefly some of the more important physical qualities of this metallic element.

In the first place, as is well known, radium resembles the solar spectrum in giving forth three principal kinds of rays which are distinguished from one another by their varying power of penetration and by the difference in the effect pro-

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duced. The alpha ray is so feeble that it penetrates scarcely, if at all, beyond the skin. The beta ray is stronger, but the greatest depth of penetration is obtained with the gamma ray, a distance of from 9 to 10 cm. The alpha ray has a decidedly cauterizing action, a quality which is entirely lacking in the gamma ray, which possesses the peculiar quality of the metallic element in destroying tissue. For therapeutic purposes therefore the alpha and the soft portion of the beta rays should never be used. A failure to recognize this fact has led, as we shall see later, to serious error on the part of at least one of the observers who has reported his results, and is sufficient in itself to disqualify his findings.

To secure the proper therapeutic result then, it is necessary that the radium should be screened. It has been found that even a thin screen of paper is sufficient to cut out the alpha rays. To exclude these and the soft beta rays, however, a filter made of lead usually has been employed. Only second in importance to the character of the rays used is the dosage to be employed. This demands much experience, and in many cases, no little judgment. In small dosage radium stimulates tissue growth. In large doses it is a destroyer of tissue. Undoubtedly many of the failures reported are due to the fact that not a sufficient sized dose was used, or what is equivalent, a small dose was not used for a sufficiently long time. Another important point is as to how often the applications should be made and how many in all will be required. Here authorities differ. In the German clinics the small dosage has been the practice, repeated bi- or tri-weekly for a period of from one to three months. In this country, we have believed more in the massive dose applied at longer intervals and then for only a few times.

It is as true of radium as we know it to be of salvarsan that we are dealing with a powerful and dangerous agent, so we should never lose sight of the fact that we may do harm with it as well as good. Personally we have seen no ill results, but recently we have been informed of a case where radium was applied to the larynx externally for carcinoma with the disappearance of the growth, but where later a stenosis of the esophagus has developed.

All the investigators who have employed it in the ear have

made use of the metallic element itself and not of the emanations which have been used elsewhere with such good results. Only so far as superficial growths of the ear are concerned would the observation apply that the skin is disposed to carry away the radium energy, and so with advantage can be frozen or otherwise treated to avoid this.

One of the unsettled questions in connection with radium is exactly what takes place in the disappearance of the growth. One theory that has been frequently advanced, especially in the case of malignant growths, is that the element heightens autolysis. Another striking fact is that the pathologic tissue is far more susceptible to the radium ray than normal tissue. It would appear that in large doses the radium causes a necrosis of the tissue.

Among others who have studied the effect of the drug on the ear are Ewald and Marx, who conducted a series of experiments upon the labyrinth. Their work was independent of one another but agrees in showing that, applied in the auditory canal of guinea pigs, it causes a complete loss of hearing. This, it is interesting to remark, often did not take place immediately, but sometimes several months after the introduction. Marx found postmortem complete destruction of the organ or Corti.

With this short introduction let us consider in detail the various clinical reports on the subject which we have succeeded in assembling. First, as to the results obtained in chronic deafness. Here the case reports are so mingled that it is impossible to divide these into those cases dependent upon middle ear disease as distinguished from those where the internal ear was alone or chiefly involved. Ten men have reported their results. Of these three only make favorable reports. Hugel in Germany, Lake in England and Bryant in this country.

Hugel's work was done in Passow's Clinic in Berlin, and his results are so remarkable as to receive the designation from one of his critics of "being a fairy tale." He made use of the radium without any screen and employed five mg. from one to two minutes upon the mastoid or for half a minute within the canal.

Lake's experience with radium is limited to a single case

of otosclerosis where applications of one-half a mg. introduced for twenty minutes in a silver tube in the auditory canal at intervals of four days gave marked improvement to the hearing.

The report of W. Sohler Bryant appears in the New York Medical Record for 1914 and is a careful analysis of twenty cases or forty ears where he has employed the metallic element. These forty ears are divided into nine cases of otosclerosis, twelve of atrophic middle ear catarrh, thirteen of residual O. M. P. C., three of hypertrophic middle ear catarrh and two of nonsuppurative labyrinthitis. His results show improved hearing in thirty-three ears, decline in hearing in one, unchanged in six. These six were cases of residual O. M. P. C. There was marked improvement in fourteen ears—six atrophic, two hypertrophic, one nonsuppurative, three otosclerosis; in six ears there was a restoration to normal of the hearing. These represented two following O. M. P. A., two hypertrophic middle ear, two atrophic O. M. C. C.

Bryant also gives in detail (New York Medical Journal, July 4, 1914) the report of a case of middle ear deafness caused by chronic suppuration where radium was employed with benefit to the hearing and the tinnitus which was present. The patient was a woman of fifty-four years, who had been operated upon for recurrent mastoiditis and chronic middle ear disease. She complained of loud and persistent tinnitus. The hearing was lost in the left ear and greatly reduced in the right. Radium was applied at intervals of five or six days, presumably three applications in all. Five mg. of mesothorium bromid were used. "After the first application the tinnitus was relieved. After the last application it stopped and has never returned. The patient hears the voice now apparently well. Her intellect is clear, and from a person almost totally deaf and indifferent she became observant and responsive."

The remaining seven observers failed to obtain satisfactory results. Of these Passow, Dreyfuss, Hegener, Bruhl and Henlein followed accurately the technic of Hugel. Bruhl used eight mg. carried deep into the canal in a lead filter without improvement to the hearing. Henlein's study is a careful one. Only one case in his series showed any improvement by

actual functional tests. Passow is strongly of the opinion that it is of no value for the improvement of the hearing. Albrecht applied it in nineteen cases of hard hearing; eleven otosclerosis, two chronic middle ear disease with tinnitus, two chronic middle ear without tinnitus, four disease of the inner ear. No improvement in the hearing was obtained in any of them.

The most careful and exhaustive report in the literature is that of Victor Urbantschitsch. In addition to employing radium for many other conditions he gave it a careful trial in chronic deafness. Seventeen cases of hard hearing, many of them with an old perforation permitting introduction through the drum, were treated with radium. Five showed no improvement at all. Twelve he describes as "naherverfolgt." It is his conclusion that good results have been secured and can be secured in such cases occasionally, but, on the whole, the results are poor.

Fraser in an extensive report on the use of radium at the Royal Infirmary in Edinburgh refers to two cases of otosclerosis and one of chronic middle ear deafness where radium was used without benefit. He is of the opinion that nothing can be expected from its employment in such cases. What comment is to be made upon these several reports?

In the first place, they are limited in number. The work in most of them, however, has been carefully carried out so that we are able to draw a pretty fair conclusion. The first thing that strikes us is the striking discrepancy between the findings of Hugel, Lake, Bryant and the others. The report of Mr. Lake, while it is decidedly encouraging, concerns a solitary case, and the important factor of suggestion has apparently not been taken into consideration. To this Henlein has given the weight to which it is entitled. In the series of cases which he studied, the treatments were part of the time with the lead filter alone without radium, and at other times with the radium in the filter. With each method he succeeded in getting improvement in the hearing subjectively, and he reached the conclusion that suggestion and hysteria were accountable for the remarkable results which Hugel reported that he had obtained in his patients. He directs attention also to the fact that, with the application of the

radium only to the mastoid, as Hugel did, a penetration deep enough to affect the internal ear was impossible.

If we exclude the case of Mr. Lake and regard as discredited the findings of Hugel, the only favorable report is that of Bryant. No one will for an instant question the sincerity of our fellow-member, and a perusal of his article cannot fail to leave the impression that his work was conscientiously done. Accurate tests, however, are wanting in the cases reported, and it may fairly be questioned whether we all would agree with the diagnosis which were made, and also with the results which were obtained. Here, as in Hugel's case, always the possibility of suggestion has to be borne in mind. So far then as hard hearing is concerned, we are forced to the conclusion that radium has been of no material benefit.

II.—TINNITUS AURIUM.

Hugel, Henlein, Brühl, Albrecht, Bryant and Urbantschitsch report results in the use of radium in the treatment of tinnitus aurium.

Hugel has had the same satisfactory responses which he reports in chronic deafness. We have already referred to the unreliability of Hugel's statements. Henlein, however, who has done his work with great thoroughness, makes a decidedly encouraging report. There was a lessening of the noise in eight cases where radium was employed, with an increase of the noise in only one.

Albrecht's results with radium, so far as tinnitus is concerned, were also encouraging. For the relief of intractable tinnitus he made use of the work of Ewald and Marx, and with the permission of the patient, succeeded in destroying the auditory nerve by the employment of radium in two cases. Everything had been tried for the tinnitus in the first case without relief, and finally, at the request of the patient, 23 mg. of radium were placed upon the promontory wall for thirty minutes for eight days. After five applications the hearing which remained had been entirely lost, together with the disappearance of the tinnitus.

The second case was an old radical with a severe tinnitus. Here there was no hearing except for the loud voice. To-

gether with the tinnitus there was severe vertigo. There was a normal labyrinth. After four treatments of from thirty to forty minutes with twenty mg. of radium, the tinnitus entirely disappeared after two and a half months. Objectively there was complete deafness, with a dead labyrinth.

Brühl reports the employment of radium in a similar manner, with destruction of the auditory nerve and cessation of the tinnitus. We have already referred to the relief of the tinnitus in a case reported by Bryant, where improvement in the hearing also was secured.

Six cases were treated for tinnitus by Urbantschitsch. In three it was lessened or relieved. Urbantschitsch's conclusions in this respect are the same as in regard to the benefit which may be expected from its use in chronic deafness, namely, that occasionally good results may be secured, but usually they are poor.

From these several reports we may conclude that radium offers more encouragement for the relief of tinnitus than when it is employed for the relief of hard hearing. Particularly does it seem indicated in intractable tinnitus where relief is imperative and where in the past a surgical destruction of the auditory nerves was necessary.

III.—VERTIGO.

The reports are meager in regard to the use of radium in vertigo. One of the two cases of Albrecht's previously referred to, where he employed radium for destruction of the auditory nerve suffered from severe vertigo as well as from tinnitus. The relief to the vertigo after four treatments of 23 mg. was just as complete as it was for the tinnitus. The case of Brühl in which he made use of radium with the same end in view was relieved of the vertigo at the same time as of the tinnitus. Finally Dreyfuss reports two cases where the vertigo disappeared from the use of a weak preparation of radium, .6 mg., used for fifteen to twenty-five minutes. It is clear here that no destruction of the auditory nerve was sought for or effected. Even with these few reports we are warranted in concluding that radium can be

employed with hope, if the condition is severe enough to justify the destruction of the labyrinth.

IV.—OTITIS MEDIA PURULENTA CHRONICA.

Urbantschitsch reports a case of chronic suppuration continuing after the radical operation, where epidermization and cessation of the discharge were secured in four sittings by the use of 17 mg., introduced in a film of rubber and paper. He further states that occasionally good results can be secured in chronic middle ear suppuration, especially in the tubercular ears of children. Here he has employed radium emanations with prompt results. In three cases the granulations were caused to disappear. In one case with caries present there was a healing of the caries fourteen days after the application of the radium. In three other cases of middle ear suppuration there was a drying of the discharge without a positive cure. Dreyfuss reports six cases of chronic middle ear suppuration in which a cure was secured in three. He was altogether unsuccessful with the use of the emanations in these cases. In this group of cases, as in those of vertigo, the reports are too few to warrant any sure conclusions. The most that can be said is that the results of Urbantschitsch, who was a most careful observer, are encouraging.

V.—NEW GROWTHS.

Finally, as to the results obtained in the treatment of new growths. It has been, as is well known, chiefly in the treatment of new growths that radium has been employed. Superficial cancer has, wherever situated, responded favorably. The literature in regard to the results obtained in cancer of the ear are equally satisfactory, provided that the cancer is located externally. Urbantschitsch reports a case of epithelioma of the ear muscle which was cured after repeated treatments extending over three months. The patient was a man of 73 years. The growth was a centimeter and a half in diameter and rapidly extending. Here 19 mg. of the radium were employed. The exposures were one to three hours. Recurrence and death occurred within a year.

The second case was one of sarcoma of the ear muscle in a patient of 40 years with a node in the auditory canal ex-

ternally, the size of a pea. Treatment one to three hours caused disappearance of the growth.

The third case was one of tuberculosis of ear muscle and canal and was cured.

The fourth case was one of lupus of the ear muscle with a possible cure.

Urbantschitsch states, that so far as the appearance of the ear after the employment of radium is concerned, the result is all that can be desired. The larger question is whether radium is of any value in deep seated cancer of the ear. Upon this subject unfortunately the literature is entirely lacking. A personal communication from Dr. Burnham of the Howard Kelly Hospital states that he has treated a number of cases of epithelioma of the ear with radium, and those in which there is not an extensive involvement of the bone and periosteum do very well. He does not state whether the epithelioma were entirely superficial or not. Presumably that is the case.

Dr. H. H. Janeway of New York reports that he has had virtually no experience with radium in malignant disease of the ear. One case of carcinoma of the external auditory meatus, where it was employed, did not do very well. His experience with external epithelioma of the ear is encouraging. We know of only one case beside the one which we are about to relate where it has been used for a malignant growth situated inside the auricle. This is a case reported by Dr. Joseph Bissel of the Radium Sanitorium of New York, and was a man of forty years. The epithelioma was a small one in the exterior auditory canal. Five applications of radium ten minutes at each seance completely relieved him of any apparent disease. It is too early to speak of the possibility of recurrence.

The history of our own case is of more than usual interest.

The patient is a man of thirty years, who was first seen four years ago complaining of difficulty in hearing which had existed for two years. He was not aware of any discharge, and there was no history of previous suppuration. There had been a nasal operation the preceding year. He stated that there was occasional pain in the affected ear. Examination gave complete loss of hearing in that ear. The eustachian

tube was open. There was a negative caloric and negative turning, showing that the labyrinth was dead. At the first examination there seemed to be a distinct deposit on the drum membrane. This later proved to be only a thickened and reddish drum. The landmarks could not be made out. There was no perforation of the drum and paracentesis failed to bring about discharge. A diagnosis was made of chronic labyrinthitis. In the course of the following month the pain in the ear increased and there were recurring attacks of hemorrhage. At this time an easily bleeding growth was recognizable, springing apparently from the floor of the canal. The canal seemed to be full of cholesteatomatous material. An X-ray picture showed apparent bone changes in the mastoid, and an operation was decided upon. This was performed in April, 1913. The removal of the growth from the canal was attended by severe bleeding. The examination of the tissue was not entirely satisfactory, but pointed to malignancy. (The report has been lost, so we are unable at this time to state whether it was epithelioma or sarcoma.) Prompt recovery took place, with no recurrence of the growth. Nine months later, while the drum could still be seen, there was a soft, nonbleeding mass on the floor of the canal. At this time an interesting complication presented itself, namely, a complete paralysis of the left vocal cord. The only explanation for this seemed to be in a metastasis into the glands of the chest, with pressure on the recurrent nerve. An X-ray picture of the chest, however, was entirely negative. The Wassermann blood test was also negative. The growth in the canal seemed to be threefold, on the floor, on the anterior wall, and on the posterior wall. The patient was not seen then for a year and a half. On May 9, 1916, a slight paralysis of the left upper eyelid had developed. He could only close the eye with difficulty. There was also partial paralysis of the facial muscles on the affected side. The voice was strong, although no change had taken place in the character of the paralyzed cord. Slight discharge from the ear was present. The growth now completely filled the canal. The drum was not visible. A second Wassermann was taken, and was also negative. It was evident that any operation must be extensive and the outcome far from encouraging. It was

accordingly decided to employ radium. Two treatments of thirty minutes of 25 mg. of radium produced a distinct shrinking in the size of the growth. There was no reaction. Three further treatments followed, also without reaction. The patient was seen next in October, 1916. During the summer he had continued in perfect health. Examination showed that the growth in the ear had not increased. If anything, it was smaller. A further course of three applications of radium was made. This time the amount used was the same (25 mg.), but the time of the application was increased to one hour. The growth has continued slowly, but distinctly, to recede, although at present the canal is still filled with the growth, beginning some distance inside of the external orifice. The patient has had no pain and very little discharge, and is able to do his work as a clergyman without any difficulty. It would be far from right to state that the case is in any sense cured, but in the patient's opinion, and our own, we feel that radium has given results far in excess of anything that could have been secured by radical surgical invention, and it is proposed to persist in its use.

CONCLUSIONS.

As a result of our study we regretfully are forced to the conclusion that radium, up to the present time, has failed to be of any considerable benefit in the treatment of diseases of the ear. So far as chronic deafness is concerned, it has proved virtually a failure. In the rare cases of intractable tinnitus and excessive vertigo, on the other hand, it can be employed with a reasonable hope of relief by its power of destroying the labyrinth. Finally, so far as malignant growths are concerned, it is of value when they are superficially seated. When deep seated there is nothing sufficiently encouraging to be said of it to warrant its use to the exclusion of operative measures where they can with propriety be adopted. The work that has already been done with it on the ear is not enough to condemn it "in toto," however, and it is to be hoped that other investigators will take it up and give it further thorough and careful trial.

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ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

A Case of Labyrinthitis Syphilitica.

SPINOLA, COLOMBOS.

Brasil méd., Rio de Jan., 1917—237.

After giving the history of the case, the writer states that the Babinski treatment was adopted, removal of the spinal fluid. Salvarsan was given and numerous intravenous injections of cyanide of mercury after equilibrium was reestablished.

Otitic Meningitis Without Suppuration of the Cavum Tympani.

EIRAS, FRANCISCO.

Brasil méd., Rio de Jan., 1917—333.

The author claims that the surgical intervention should not be postponed twenty-four hours in cases where there are meningeal symptoms, and reports one case where the pus was found in the mastoid antrum, and one, not operated, where the pus was found at autopsy.

A Survey of Ear Conditions in Young Children.

KOBLER, E. WILLIS.

N. York M. J., 1918—CVIII—66.

The writer has examined the ears of five hundred school children in New York City, and his observations have led him to the conclusion that discharge from the ears of young school children is more prevalent than is usually supposed. He points out that this is of vast importance as bearing on acuteness of hearing in later school life. The number of cases of impaired hearing in later school life, however, is relatively smaller, which may be explained by the fact that in many cases corrective treatment has been instituted and tonsils and adenoids removed. Many cases of defective hearing do exist nevertheless, and may be accounted for by the neglect and

refusal of parents to remedy defects, deformity of the nasal septum which cannot be corrected in early age, abnormal collection and deposit of cerumen, coupled with uncleanness, catarrhal conditions of the nasopharynx with incomplete and insufficient instruction in nasal and oral hygiene, and the lack of adequate instruction in aural hygiene. Home remedies and adjuncts for earache are also frequently harmful. The author believes therefore that a special extended survey and examination of the ears of school children should be made with reference to the conditions mentioned. Emil Mayer.

Indications for Tubotympanic Insufflation With Thermal Waters (Sulphur-Soda).

FOURCADE.

Rev. hebdomadaire de laryngologie, etc., Paris, 1917—XXXVIII—295.

The author thinks that the value of insufflation with sulphur-soda mineral waters or their vapors lies somewhere between the estimates made by ardent advocates and equally ardent opponents. In France are three places where the method is currently employed, namely, Aix les Thermes, Luchon and Canterets. Fourcade, who is at Canterets, thinks this treatment is reasonably efficacious in prolonged and recurring subacute tubal catarrh, chronic tubal catarrh, terminal stage of exudative catarrhal otitis, chronic exudative tubotympanitis, dry chronic adhesive otitis media, cicatricial otitis, and interstitial forms of otosclerosis. Contraindications are: Acute purulent otitis, chronic noncicatrizated otorrhea, atrophic form of otosclerosis (otoarteriosclerosis), primary labyrinthitis and deafness from a central lesion. A. Miller.

Late Meningitis After Fracture of the Petrous Bone.

DE RUYTER, L.

Rev. hebdomadaire de laryngologie, etc., Paris, 1917—XXXIX—245.

The circumstances which give rise to an infection of the meninges, as well as the interval between the accident and the beginning of the meningitis vary considerably. It is needless to say that the danger of a meningitis is much

greater if a suppuration of the ear has existed prior to fracture of the petrous. Ordinarily, the trauma causes a fracture of the tympanic ring and a tear in the tympanic membrane; here the path of infection is evident. Otitis is particularly apt to follow ill advised treatment, such as lavage or instillations in the ear. But wounding of the ring or tympanum is not essential, for infection may occur by way of the eustachian tube, and Manasse reports such a case. Ruyter's case is similar. Two classes of delayed meningitis are to be noted: in one class the meningitis comes on early but remains subacute and latent for a time; in the other class the meningitis ensues only after a considerable lapse of time. Klestadt details a case in which the patient succumbed 209 days after the accident.

De Ruyter's case was of a man, aged thirty years, who was thrown from a motorcycle in July, 1914. He was examined a half hour later by a doctor for an insurance company. The patient had been able, with assistance, to walk to the consultation room. He answered questions normally, but could not clearly recall the details of his mishap, nor was he aware that he had been unconscious for a time afterward. He had bleeding from the left ear and left naris, showed abrasions about the occiput, complained of violent headache and pain in the region of the left temporal, and vomited several times during the examination. Pulse about normal. Diagnosis: Fracture of the base of the skull. The patient was taken to the clinic: iced compresses were applied to the head and a tampon was put in the left ear; no irrigations. For several days the headache continued; temperature ranged from 37 to 38 degrees C. The patient complained constantly of "something loose in his head." From the beginning hearing in the left ear was lost, there was tinnitus, and vertigo was almost constant.

In October, 1914, the patient was called for military service; his symptoms then were so slight that they were deemed to be functional, and for a time he was kept under observation as a traumatic neuropath. In December he was examined by an otologist, Dr. Quix. At this time the patient complained of deafness and tinnitus in the left ear, vertigo, difficulty in walking in the dark and impaired memory. Both

right and left tympani showed calcareous incrustations, but the left tympan was unbroken. Cranial perception of the fork was shortened for the left ear; air perception for the fork ranged from C to C⁴. Weber lateralized to right. Left ear gave positive Rinné; Schwabach shortened. Rotatory nystagmus to left. Injection of cold water in left ear negative. Positive Romberg, patient falling backward and to left.

Suddenly, January 29, 1915, he was taken with intolerable headache. Progressively there set in a rise of temperature to 39, 39.6, 40.5 degrees C., with a pulse of 72, impaired vision, retention of urine, delirium, Babinski sign, exaggeration of tendon reflexes, but no paralysis. Lumbar puncture brought pus-like fluid with staphylococci on culture. Death February 7, 1915.

At autopsy quantities of pus were found at the base of the brain, especially right. No cerebral abscess. Each of the two poles of the temporal lobes had some yellow plaques the size of a two franc piece, of traumatic origin. No thrombophlebitis. At the base of the skull the left petrous showed a doubtful line of fracture where the dura mater was a little more strongly fixed.

Both auditory apparatus were prepared and sectioned parallel to the posterior (cerebellar) surface of the petrous for microscopic examination. Findings are described very minutely and include the following:

On the left side the tympanic cavity was entirely filled with pus cells, fibrin and a finely granular mass coloring strongly with eosin. The mucosa was thickened and its vessels dilated. Tympanic membrane intact. The lesions indicated an otitis media without perforation. In the wall of the labyrinth and in the promontory was a fracture which had detached a part of the promontory from the labyrinth. The fracture continued between the round and oval windows, and gave communication between the middle and internal ear. In the cavities of the labyrinth were granular masses of pus and fibrin. Pus had infiltrated the ramifications of the auditory nerve throughout its course, and all the findings indicated that it was by this route that the infection reached the meninges.

The following deductions are offered:

Every case of fracture of the cranial base should be examined by an aurist, and under no pretext should the ear or nose be irrigated.

In every case of meningitis following traumatism, when the origin of the infection is not shown by autopsy, both auditory apparatus should be examined histologically.

Fracture of the petrous into the cranial cavity has no great importance in the cause of delayed meningitis. The infection ordinarily follows the same path as in meningitis consecutive to labyrinthitis.

It is not advisable to operate, on principle, for fractures of the petrous. Operation is indicated if there is an accompanying labyrinthitis.

A. Miller.

The Enterococcus as a Cause of Serious Endocranial Complication of Otitic Origin.

CALICETI, P., AND VAGLIO, R., *Boll. clin.*, Milano, 1918—XXXV—9.

It is well known that the enterococcus described by Thiercelin may give rise to acute purulent infections of the tympanic cavity and cause severe endocranial complications.

Case 1.—Soldier. Suppuration in right ear. Otoscopic examination showed large perforation of tympanic membrane, abundant otorrhea. Severe pain appeared in the right ear radiating over whole right side of head. Intense pain in the mastoid region. Temperature, 36.9°. March 30th, operation: Under chloroform anesthesia the mastoid antrum was opened. Only two small cells were found filled with pus. These were cleaned out and iodoform gauze used as packing. Next day patient was much excited and suffered from severe headache. Temperature, 39.4° C. Right eye showed slight exophthalmus with edema of eyelids, gradually accentuating conjunctival chemosis, mydriasis and ptosis of upper lid. Death occurred during the night. Postmortem examination showed diffuse hyperemia of dura, right cavernous sinus filled with a thrombic mass, the same condition in inferior petrosal sinus. Bacteriologic examination: Numerous Gram positive diplococci.

Case 2.—A soldier was transferred from a field hospital for suppuration of left ear which, the patient said, had lasted

for two months. He had severe pain in left ear and left side of body. Temperature, 38.4° to 39.4° C.; pulse, 110. Mastoid was red and swollen, very sensitive. In the fibrocartilaginous portion of the auditory canal there were numerous granulations, almost occluding the lumen. Slight nystagmus was present.

Operation under chloroform anesthesia. Radical operation was performed; mastoid antrum was filled with pus, and in the tympanic cavity were numerous fungoid granulations. The mastoid wound was enlarged and wall of lateral sinus exposed. Nothing abnormal was found. Temperature fell from 39.4° to 37.2° C., but rose again next day to 39.4° C., followed by coma and death. Postmortem examination showed small foci of purulent leptomeningitis, left lateral sinus filled with thrombotic mass. Bacteriologic examination: Numerous Gram positive diplococci.

Case 3.—Soldier, twenty-three years old, transferred from a field hospital, had right sided tympanic suppuration, which lasted for the last ten days, severe headache, disturbances of equilibrium, vertigo. Otoscopic examination showed auditory canal ulcerated and covered with abundant granulations, membrana tympani completely destroyed, Romberg symptom and nystagmus, slight mydriasis, intense pain and vomiting were present. Temperature rose to 40.2° C. Operation under chloroform anesthesia. Atticoantrectomy revealed osteomyelitic process of mastoid and attic, and seropurulent masses in mastoid antrum which were curetted. After operation the temperature fell to normal, but soon patient got worse, with vomiting, paralysis of eye muscles, Kernig's sign and death. Postmortem examination showed diffuse leptomeningitis of base and side of brain. Examination of mastoid pus: Numerous diplococci.

Remarks.—From the facts in the case it must be assumed that the germ isolated in the three cases is identical with the enterococcus of Thiercelin. The cultural characteristics are the same as those found by Thiercelin and Rosenthal. The endocranial complications produced by the enterococcus are always of a violent character and are rapidly fatal.

Survey of Head Surgery, Office of Surgeon General, U. S. A., Washington, 1918—I—69.

Thrombophlebitis of the Cavernous Sinus, of Tonsillar Origin.

Got.

Rev. hebdomadaire de laryngologie, etc., Paris, 1917—XXXVIII—313.

A soldier, twenty-two years of age, had a severe left tonsillitis. An abscess developed and opened spontaneously. Notwithstanding this, the temperature remained high; and then set in progressively edema of the corresponding jugular, temporal and parotid regions, exophthalmos, mild delirium, followed shortly by death. No operation. No autopsy. Two similar cases have been reported, one by Lapersonne (recounted by Labolette, thèse de Paris, 1891), and one by Tollens. As to the route of infection, Got observes that the pterygoid plexus of veins is in relation with the tonsillar plexus. From the pterygoid plexus infection may be carried to the cavernous sinus (1) by the sphenopalatine vein, as contended by Panas, or (2) by the veins passing through the oval and round foramina. Got thinks the latter route is most plausible.

A Case of Total Facial Diplegia.

Rossi, A.

Policlinico, Roma, 1918, sez. prat., XXV—197-202.

The patient was a man of about forty-six years, who after working in a draft at an open window was taken with slight pains in cheeks and head. One morning in endeavoring to put a cigar into his mouth he found he could not hold it straight in the left angle. There was a flow of saliva from the mouth: he was unable to expectorate and talked with difficulty. His people noticed that his face was distorted. Complete left facial paralysis was discovered on examination, and a few days later bilateral facial paralysis. Electrodiagnosis: Facial diplegia of nucleoperipheric origin due to rheumatism. For twelve days the galvanic current was applied with improvement. After three days' rest the treatment was continued. After thirty-five galvanofaradic applications the patient was cured on the right side, but traces of paralysis remained on the left side. Electric treatment was continued and the patient finally completely cured.

**A Case of Wound of the Carotid Bulb by Shot, Treated by Ligation
of the Common Carotid and End to End Anastomosis of
the External and Internal Carotids.**

LEFÈVRE.

Presse méd., Paris, 1918—XXVI—287.

The wounds of the carotid bulb, with the exception of those so small as to be controlled by suture or lateral ligation, require triple ligation—i. e., of the common carotid and its two branches. This is dangerous on account of the lack of sufficient blood passing to the brain, so the author worked out, on the cadaver, a method of anastomosing the internal and external carotids, which he afterwards used in a patient who presented a ragged wound of the bulb which could not be sutured. Having ligated the base of the common carotid, the author resected the upper part of the artery and a part of the carotid bulb to the place where the endothelium seemed healthy. The two carotids were still in contact, and it was easy to bring their edges together and suture them with silk threads sterilized in vaseline. It produced, however, an elbow which obstructed the flow of blood somewhat, and probably caused the ischemic paralytic symptoms which followed. They were transitory, however, and in six weeks there was only a marked decrease in the strength of the left side.

Medical Problems of Aviation.

BERNARD, A.

Progrès méd., Paris, 1918—XXIII—166.

In addition to the problems concerned with altitude, there are others, such as those of sight, hearing, neurologic condition, resistance to fatigue, etc. The rôle of the physician in regard to accidents is largely prophylactic—that is, he must select those best adapted for the service, and must watch them carefully during the period of training in order to observe the changes, if any, brought about by rapid alterations in height, temperature, rarefaction of the air, etc.

Selection of Candidates.—No physician can tell whether a soldier will make a good aviator. Time and his work alone will tell that. But certain moral and physical attributes can

be predicated, and these can be determined by the physician.

1. Surgical Examination.—The best age is between eighteen self to circumstances. Before then he lacks judgment; later the body does not stand well the fatigue of flight. Height and weight are of least importance. Every abnormality should be noted—e. g., a hernia, so that it cannot be used as an excuse for leaving the service. Special attention should be paid to the musculature of the abdominal wall, for if these are flaccid, syncope may come on during a rapid maneuver. Applicants with wounds must be judged each for itself. Head injury is a contraindication—such a patient easily becomes fatigued, gets headaches, becomes excited easily and suffers from troubles with equilibrium. Injuries of the body depend on their extent and interference with the respiration.

So far as the limbs are concerned, most of the work is done with the arms and hands. Therefore injuries to the lower limbs are less likely to incapacitate than those of the upper. An artificial leg may do all the work required of it. Injuries of the upper limbs which are not deforming and not too severe may not incapacitate.

2. Medical Examination.—The habits of the applicant should be investigated. Excess of smoking gives dyspnea, palpitation and diplopia. Alcohol gives similar symptoms. and thirty years, for then the individual can best adapt him- A moderate use of alcohol and tobacco after the flight is allowed by an English author, Graeme Anderson. Untreated or improperly treated syphilitics are barred until after an intensive and prolonged treatment. Malaria and epilepsy are contraindications, as are tuberculosis, bronchitis, pleurisy and asthma. Sea sickness is not a contraindication, as it is rarely observed during flight.

Digestive System.—A truss may be worn if the abdominal walls are weak.

Urinary System.—Albuminuria and glycosuria are absolute contraindications.

Respiratory System.—This should be in the most perfect condition on account of rarefaction of the atmosphere at great heights. The applicant should make a complete expiration, then a full inspiration, which he should hold as long as possible. If he cannot hold it forty-five seconds or

more, he must be rejected, as this condition approximates the oxygen content of the air at great heights.

Nervous System.—Instability is indicated by exaggeration of reflexes, tremors, insomnia and excitement. These men are predisposed to aeroneurosis.

3. Organs of Special Sense.—(1) Sight. Every aviator should have perfect sight. Glasses are not desired, as they may become displaced or broken. Vision should be normal in both eyes separately and together. Stereoscopic vision, and especially color vision, are important. Night blindness must be looked for in those selected for bombardment at night. Finally, latent hyperopia and strabismus are among the causes of bad landings.

(2) Hearing.—Pilots with deviations of the septum frequently complain of headache on landing. Mouth breathers often have angina. Deafness of either or both ears is cause for rejection. Suppurative otitis media and perforation of the drum are cause for rejection, as the patient frequently suffers from painful auditory trouble due to quick changes in altitude.

(3) Equilibration and Muscle Sense.—These are of the utmost importance, for on them the pilot depends for his sense of position. In a cloud this is lost, the pilot frequently finding himself rising or falling, so it is evidently corrected by the sight. The applicant should be put through the various tests—standing on one foot, with eyes closed; turning rapidly; estimating the weight of different objects of the same size; turning in a chair, and syringing the ear with cold water, watching the nystagmus.

(4) Psychomotor Reactions.—This consists in taking the time required by the applicant to react to a visual, tactile or motor impression, measured by some suitable chronometer. The average reaction to a visual impression is 19/100 second; auditory, 14/100; tactile, 14/100 second. Retarded, respectively, 22/100—45/100; 20/100—39/100; 20/100—39/100 second. These reactions are retarded by fatigue, excesses, sickness or cold. The pilot should not fly before another examination.

(5) Reactions of Emotions.—The aviator should not show increased respiration and pulse, as the physical representation

of an emotional nature. This can be measured by pneumographic or plethysmographic tracings after a pistol shot.

(6) Power of Observation: Attention.—Gamelli has used the mental tests of Rossolimo. From the results of the last three tests a "psychologic profile" can be drawn in the form of graphics showing (a) attention, (b) judgment, reproduction, recognition of colors; (c) capacity for observation; (d) psychomotive reaction to stimuli; (e) resistance to emotional excitations.

Period of Training.—The physician should live among the students and observe them all of the time. Psychophysiologic changes have not been studied because the necessary delicate instruments cannot be used during flight.

The pulse rate increases to 1000 M.; then decreases to 1400, above which height it rapidly increases. During descent, the pulse rate at first increases, then diminishes. The respiration undergoes the same modifications as the pulse, but remains accelerated at high altitudes on account of the lack of oxygen.

Maximum pressure diminishes up to 500 M. Then it increases a little and slowly. In the descent, it diminishes.

Minimum pressure diminishes to 800 M. Higher, it continues to decrease, but more slowly.

Mean pressure diminishes regularly during ascent, and increases during descent.

In mounting, up to 1500 M., all the respiratory cavities become congested. The aviator is relieved by breathing through the mouth and practicing valsalva. At 4000 M. the troubles disappear. On descending, the same phenomena. On landing, deafness more or less prolonged, and sometimes aural bleeding. Complete rest after landing for fifteen to thirty minutes is very beneficial. Rest for a month will cause persistent troubles to disappear.

Most accidents are on landing, and are due to lack of binocular vision, fatigue, fear or illness.

In the center of each camp should be an observation post, from where the doctor can be telephoned the place of the accident, to which an auto can take him at once. He should have a kit containing ordinary bandages, anesthetics and stimulants, also a scissors, knife and fire extinguisher.

II.—NOSE.

Deformity and Obstruction of the Nose.

MARCONDES, CASTILHO.

Brasil méd., Rio de Jan., 1917—220.

The author presented a photograph, taken before the operation, of a woman who had atresia of the aperture of the nose. By means of operation the turbinates were separated from the septum and the nasal deformity corrected with injection of paraffin.

J. Szymansk.

Hay Fever Pollen Extracts and Their Standardization.

SCHEPPEGRELL, WILLIAM.

Med. Rec., N. Y., 1918—XCIV—141.

The strength of the pollen extracts should be stated in units to the cubic centimeter, the standard unit in pollen therapy being 0.001 mg. of pollen protein. The most convenient strength is 100 units to the c. c., this being the most practical for both the diagnostic tests and the treatment. For the former, we inject into (not under) the skin, 0.05 c. c. of this strength, containing five units, which is sufficient to produce a well defined reaction in sensitive subjects and without danger of developing anaphylactic disturbances.

The usual doses of pollen extracts range from five to fifty units, which is represented by 0.05 to 0.50 c. c. of this extract. The pollen extract of 100 units to the c. c. therefore simplifies the application of pollen therapy and diagnosis.

Diluents have been recommended when less than 1.00 c. c. is injected, but we have not found this necessary or advisable, and, as it unnecessarily complicates the technic, it should be omitted.

The pollen used for preparing a special extract should belong to a single variety or class. Combinations, except as far as they belong to the same class of pollens, should not be used. Our investigations have shown that there are certain pollens in which the biologic reactions (hay fever) are similar and which can therefore be combined in one preparation.

It is permissible to use any convenient variety of grass

pollen, or a combination of several, for the grass pollens. This group is preferably called: (1) "Gramineæ," as it includes rye, wheat and other varieties which are not popularly recognized as belonging to the grass family.

The four varieties are: "Gramineæ," "Ambrosiaceæ," "Artemisia," and "Chenopodiaceæ."

These four groups are responsible for most of the hay fever in the United States.

The date of manufacture of pollen extracts should be stated. In spite of the utmost care in their preparation, the activity of some of the pollen extracts diminishes materially after the first season. This is observed not only in the diagnostic tests but also in the effects of the treatment.

Emil Mayer.

The Use of the Turbinates and the Septum in the Repair of Injuries and Defects of the Wall of the Nasal Cavity.

HETT, G. S.

Lancet, London, 1917—II—892.

The author uses the middle and inferior turbinates and also the septum nasi to repair damage to the nose due to war injuries. The inferior turbinals especially have proven successful in wounds in the floor of the nose causing perforation through the palate. The writer takes advantage of the fact that adhesion between the septum and turbinates readily form if there is an abrasion of cartilaginous surfaces, and, owing to their vascularity, the vitality of the turbinals is great. In cases of the destruction of the alæ and turbinates, the anterior one-half of the opposite inferior turbinate has been used as a free graft attached anteriorly to the septum and posteriorly to the junction of the nasal floor and outer wall of the nose.

In case of loss of the upper part of the bridge of the nose the middle turbinals are useful in filling up the hole and also in combination with the septum they can be made to form a support for the skin flap which covers over the gap. They have the added advantage that the mucous membrane of their deep side can be left, and thus form a mucous membrane lining as well as a support for the overlying skin flap. A turbinate

may be first semidetached and its posterior end made to form a new attachment, and subsequently its anterior end may be cut free and advanced to a new position. This was found useful in a case of destruction of the whole nose with great loss of tissue due to destruction of the nasal process of the superior maxilla. In a case of perforating wound of the nose in which the external wound had closed there was depression of the bridge with undue prominence of the tip with nasal obstruction. Here a submucous resection was performed, and the cartilage removed was inserted beneath the skin to correct the depression. Heterogeneous septal grafts when the soft tissues of the septum remain intact are spoken of as a possibility, but no cases are cited. For bringing up the prominence of the bridge two other methods are described. This is the method of the septal swing either upward, downward or laterally.

In the case of the upward swing the septum is cut backward along the floor at the junction of the maxillary crest. The cut is then continued upward toward the roof of the nose, and the septal flap, including cartilage and mucous membrane, is swung forward, remaining attached by a pedicle above. It is retained in position by advancing the two turbinals so that a pent house supports the partition. This is useful for producing a prominence due to loss of tissue of the upper part of the bridge. The reverse of this is done for the lower septal swing and is useful in pug nose.

Ira Frank.

Mycosis Fungoides.

VERCO, JOS. C.

Med: J. Australia, Sydney, April 20, 1918.

A man aged forty-five years had the right upper maxilla removed for a growth which filled up the cavity of the antrum and extended through its outer and posterior walls and through the alveolus. Histologist reported it a round celled sarcoma, although he reported at the same time that its structure was not typical of sarcoma. Later an eruption appeared on the body, which was diagnosed as mycosis fungoides. Four months after the jaw operation a large mass

was removed from the foot. Histologic appearance was identical with the jaw tumor. The growth on the foot was without question a typical case of mycosis fungoides. Eruption and growths appeared on various parts of the body, all typical of mycosis fungoides. The man died after two years. No recurrence of growth in jaw took place. The case is regarded as one of mycosis fungoides, having its primary site in the antrum of Highmore.

A. J. Brady.

Nasal Reconstruction.

AYMARD, J. L.

Lancet, London, 1917—II—888.

Although methods for reproducing the nose have been fully described in textbooks, the causes for failure are rarely dealt with, and details of the work are sadly deficient. Almost the greatest difficulty presenting itself is the fact that when the nose has been destroyed by injury the new flap has to be implanted on scar tissue. Probably the most common cause of failure is the fact that the nasal cavity is not ideally aseptic at any time. The flap should be taken from the site likely to lead to the least ultimate disfigurement. The lining of the flap should be something else than scar tissue. The new organ should as much as possible conform to the old one. The supporting framework should simulate the original. The bed area for the new nose should be most carefully prepared.

As to the skin flap, Aymard is trying a new method, taking a long pedicle flap with its base near one clavicle, and forming the nose on the chest, keeping the head bent slightly for fourteen days. The hope is to save time as compared with the forehead flap. If it fails, Aymard will go back to the older method of taking a small flap from the forehead and alar flaps from the cheek. He favors cartilage for the supporting framework, taking it from the eighth costal. This forms the anterior framework of the nose and may be supported laterally either by turning up the turbinates (Hett) or by turning down a skin flap. He also favors swinging a portion of the septum forward for a support.

Great care must be given to preparation of the skin area

upon which the new nose is to be embedded, and it is advisable to undercut the skin and tissues in order to contract the opening and bring new healthy tissues into the region. Reformation of the lip is frequently necessary.

He gives photographs showing the remarkable result of nature's plastic surgery; in the first photograph the nose and upper lip seem to be almost completely destroyed; in the second restoration seems wellnigh complete, save for a small hiatus at the nasal tip; here the only treatment was a paraffin dressing.

Initial Syphilis of the Nasal Fossæ.

BASILE, G.

Policlin., Roma, 1918, sez. prat., XXV—510-514.

Primary syphilitic lesions of the nasal fossæ are rare, yet Munchheimer found such lesions in 4 per cent and Vignolo-Lutati in 5 per cent of all cases of extragenital chancers.

Case 1.—Girl, twelve years old. First noticed a slight catarrh, which increased in severity. Soon there appeared obstruction to breathing, mucopurulent secretion, weakness, anemia and occasional headache. Examination of left nasal fossa showed a tumor on the anteroinferior portion of the nasal septum. There was no pain. The lymphatic gland at the left angle of mandible was enlarged. The tumor was removed with the cold snare. Slight hemorrhage. Bacteriologic examination showed spirochetæ. Treatment: Anti-syphilitic.

Case 2.—Man of thirty years. First had neuralgic pains on left side of head. At the same time there were intense coryza in left naris, producing in a few days complete occlusion, abundant serous secretion and fever. Examination of left nasal fossa showed swelling with erosions on the inferior turbinate. In the mental region a few lymphatic glands enlarged. Diagnosis: Syphilis.

Primary syphilitic lesions of the nasal fossæ may assume three forms: (1) A tumorlike growth, as in the first case; (2) an erosive diphtheroid form, as in the second case; (3) an impetiginoid form, which is very rare and difficult to diagnose. Fournier has described these three forms as

the most common. An important diagnostic point is the finding of enlarged lymphatic glands in the submaxillary region. The seat of the chancre is almost always on the external wall of the nasal fossa.

III.—PHARYNX AND MOUTH.

Three Cases of Adenoids With Hypophyseal Feminism.

CITELLI, S., AND CALICETI, P.

Policlinico, Roma, 1918, sez. prat., XXV—245-250.

Case 1.—Soldier, twenty-five years old. Intellectually deficient, with marked hypotrichosis. There were traces of gynecomastia; pelvis was very large; the patient presented typical signs of adenoids (facies adenoidea), but none were found. Injection of endohypophysin (whole gland) caused a rise of temperature and headache, and was without any success.

Case 2.—Soldier, twenty-two years old, with diminished intellectuality; mouth always open; forgets easily; some adenoids still present; hypotrichosis; pelvis large. Injection of endohypophysin was followed by no improvement, but with rise of temperature.

Case 3.—Corporal, twenty-one years old. Was always markedly forgetful in school. Sexual powers very weak; adenoid facies; hypotrichosis. Injection of hypophysin caused rise of temperature. The rise of temperature after injection of pituitary extract in these three cases suggests the hypophyseal nature of this symptom complex.

Vincent's Disease of Mouth and Pharynx.

McKINSTRY, W. H.

Practitioner, Lond., 1917—XCIX—507.

The writer makes an extensive report. He examined microscopically smears from 1,320 healthy soldiers and found fusospirochetal organisms in 32. He found in 230 healthy recruits 95 positives. He made smears from ulcerations; dried, fixed and stained them in dilute carbol fuchsin for a

few minutes; then dried and examined under oil emersion. In every case almost pure culture of fusiform and the spirochete were found. The pathologic changes are most frequently found after some erosion of gums or tonsils. The lesion may be found on gums, tonsils, cheek, palate or pillars of fauces. It is usually covered by thick, soft, creamy membrane which can be easily removed. The ulcer may be irregular or punched out and has a very angry look. Another form resembles depth in that the membrane clings to the surface and when removed bleeding takes place. The gums are attacked three times as frequently as tonsils. The frequent site is about the teeth and has been named "peridental ulcerative gingivitis." Pain, bleeding, foul breath and bad taste in the morning are usually complained of. As a rule there is no constitutional disturbance. Temperature is usually normal. Cases may be very acute, but many are chronic. The so-called "trench gum" is found to be typical of this disease. Under treatment most acute cases are well by three weeks. The chronic cases are liable to be refractory. In treatment all teeth should be cleaned of tartar. The teeth should be cleansed t. i. d. with soft brush and peroxid or chlorate of potash. He has found that alkalin salvarsan solution, twice venous injection strength, applied to lesions every day until cultures are negative gives best results. Usually ulceration of mouth and tonsils are relieved by same treatment as that applied to gums.

E. R. Holmes.

A Few Notes on the Treatment of Gunshot Wounds of the Mandible and Maxilla.

FRY, W. K.

Lancet, Lond., 1917--CXCIH—852.

Fracture of the Mandible.—As soon as possible skiagrams are taken to demonstrate the situation and extent of the injury to the bone. For this purpose an anteroposterior in addition to a right or left special view is always taken. If a fracture of the coronoid process or neck of the condyle is suspected it is best to take the skiagram with the mouth open. When a fracture is present in the regions of the horizontal and ascending rami a lateral view is always necessary. It is

very important to repeat these lateral views at intervals of a month to six weeks, in exactly the same position, to detect any change in position of fragments and note progress.

The skiagram shows: (1) Teeth involved or likely to become involved; (2) the amount of bone lost; (3) type of displacement; (4) presence of foreign bodies, metal fragments or displaced teeth.

Treatment.—When the wound is very septic, free extraction of the teeth is the rule. Any tooth which is in the line of fracture or likely to become involved by absorption of bone is removed. It is important to preserve a tooth on the posterior fragment, even temporarily, for splinting purposes. At the time of extraction of the teeth free drainage is always established. A piece of rubber tubing is placed between the ends of the bone and brought into the submaxillary or submental region of the neck. The drainage tubes are left in from fourteen to twenty days, being gradually withdrawn after seven days. No bone is removed at the time of operation except that which is very loose and obviously necrotic. Impressions are now taken for making the splints. While the splints are being made the broken fragments of the mandible are put to rest by ligaturing the teeth to the maxilla with grass line and brass ligature wire. At this stage a case is classified into one of three groups: (1) Those cases which should get primary bony union in normal occlusion; (2) those in which primary bony union is doubtful; (3) those in which it is certain no useful primary union can be got on account of too great a loss of bone.

Class 1.—These cases are splinted into normal occlusion. Upper and lower capped splints are used. Class 2.—These cases are given every chance of primary union. In fracture of the angle the fragment must be swung over to help to fill up the gap. In middle line fractures the fragments must be approximated. In these positions the jaws must be splinted for a varying period and repeated skiagrams taken. If large pieces of bone have exfoliated and no chance of union is observed, the case is treated as in Class 3. In this class the treatment consists in holding the fragments in good position with as little strain as possible on the teeth, until bone graft operation is advisable. Early operation by wiring, plating,

etc., has proved useless. Reference is made to cases of fracture of the symphysis with comminution where, after three months' splinting, an apparent bony union has been attained. A slight springiness, however, shows it to be only callous. If the splint is then removed the patient will gradually bite the fragments apart.

Fracture of the Maxilla.—There is only one class of these cases, and they are treated with success in the following way: (1) Free extraction of septic teeth and teeth involved in fractured area. (2) Early suturing of soft parts. (3) Good drainage. (4) Leaving all loose bone to exfoliate itself. (5) Supporting the maxilla with a perforated vulcanite "Kingsley" splint. The splint is held up by elastics to a head net or plaster of Paris bandage around the head. In bad fractures high up we are warned not to press up too much, lest the optic nerve be pressed upon. Plates and photographs illustrate the paper.

A. J. Brady.

The Menace of Mouth Infections.

OSBORNE, OLIVER T.

J. Am. M. Ass., Chicago, 1917—LXX—1313.

The writer's belief is that there is no greater menace to health today than crowned and bridged teeth, to say nothing of imperfectly filled and dead teeth and of pyorrhea alveolaris. Furthermore, infections of the tonsils and sinuses adjacent to the nose must never be overlooked. If such infection has not caused symptoms it will do so, and its eradication is the only safety. He reviews the usual focal infection lesions of the cardiovascular apparatus and the joints, and emphasizes the possible relation of mouth infection and chronic colitis which occurs so frequently after forty years of age. He makes a plea for better cooperation between the dentist and the physician to determine what teeth shall be preserved, what teeth removed and how best to treat the gums; also what part a diseased condition of the patient plays in a mouth infection. He further claims that no dentist should devitalize or attempt to fill the roots of devitalized teeth which are to be preserved without the aid of radiograms; that every case of pyorrhea alveolaris, every suspicious root and occasionally

all crowned and bridged teeth should be subjected to the scrutiny offered by the X-ray. Physicians should study the mouths of their patients more. He condemns the too prevalent and promiscuous use of iodine on the gums by the dentist. A review of the effects of mouth infection on the internal secretory organs of the body is given. The author summarizes his conclusions as follows: Most unexpected tolerance to pyorrhea alveolaris and to tooth infection is found. Chronic invalidism may be caused by mouth infection. Blood pressure may be raised or lowered, the thyroid gland is frequently enlarged, hypo- or hypersecreting, and serious disturbances of the blood, heart, kidneys, stomach, intestines and joints are frequent from these mouth infections. Glycosuria, serious distant focal infections and brain and nerve disturbances may occur from mouth infection. Ulcer of the stomach, pyelitis, appendicitis, chronic colitis, pneumonia, etc., may be caused by the presence of pyorrhea alveolaris and mouth infection. No treatment of all these conditions will be of avail until the mouth is made clean.

Stock or autogenous vaccines are not very promising in a therapeutic way, but in obstinate cases they should be tried.

One should not promise too much as to the cure of focal infections by the eradication of the foci in the mouth, throat and nose. Their eradication does produce brilliant cures, but does not remove the germ localized in a distant part of the body and will not restore degenerated tissues. Any fresh lesion of the mucous membranes of the mouth is a source of danger and the mucous membranes of the mouth should not be blistered by iodine or other escharotics.

Jos. D. Heitger.

A Serologic Investigation of Vincent's Angina.

TAYLOR, FRANK E., AND MCKINSTRY, W. H.

Brit. M. J., Lond., 1918—I—82.

The writers state that the Wassermann reaction is positive in syphilitic affections of the pharynx but negative in all others, with the exception of the angina of scarlet fever. This opinion, however, which is based on the careful bacteriologic examination of several hundred cases of sore throat at the

Queen Alexandra Military Hospital, is quite at variance with the views expressed in several contributions scattered through the literature of the subject, in which it is maintained that in uncomplicated cases of Vincent's angina the Wassermann reaction is found to be positive. The writers combat this view and state that where a positive Wassermann is found in Vincent's angina syphilis, either latent or active, is also present. At the Queen Alexandra Military Hospital more than three hundred cases of fusospirillary infection were recently examined. About half were typical cases of Vincent's angina (verified). From these, fifty-five cases were taken without selection: in all these cases, with but two exceptions, Wassermann was negative. The history of the two cases where the exception was noted is given. Both had syphilis ten years previously.

As a result of this investigation and a critical consideration of the cases recorded in the literature, the writers have come to the conclusion that the prevailing belief in the occurrence of a positive Wassermann reaction in Vincent's angina has no foundation in fact. When Wassermann is positive in Vincent's angina, then a double infection exists, either as a coincident syphilitis and Vincent's infection or the occurrence of Vincent's angina in a syphilitic subject. A. J. Brady.

Retropharyngeal Abscess.

RUSH, CALVIN C.

J. Am. Med. Ass., Chicago, 1918—LXXI—174.

The source of infection leading to abscesses posterior to the pharynx are usually classified under four headings:

1. Those due to caries of the upper cervical vertebræ, usually of tuberculous origin. Such an abscess, being dorsal to the prevertebral fascia, is very apt to burrow laterally and appear as a tumor in the neck, dorsal to the sternocleidomastoid muscle, where it should be opened under the strictest asepsis to prevent mixed infection. If unopened, it may follow the brachial plexus into the axilla. Regardless of the prevertebral fascia, it may, however, burrow forward in the midline of the pharynx.

2. Those due to an otitis media. The pus probably bur-

rows downward in the upper part of the eustachian tube along the tensor tympani muscle, to terminate behind the prevertebral fascia. It tends to point in the same direction as infection from cervical vertebral caries.

3. Those due to an extension inward of a carotid abscess.

4. Those due to infection of the lymph nodes of the retropharyngeal space. These nodes are one or two in number on either side of the midline opposite the lateral masses of the atlas. They receive lymphatics from the nasopharynx, eustachian tubes, nasal fossæ and accessory sinuses.

Abscesses in the pharynx should be opened in the midline, while the baby's head is held sufficiently low to allow the contents to flow out of the mouth.

Emil Mayer.

Observations on Throat Smears in Measles, Rubella and Scarlet Fever.

TUNNICLIFF, RUTH.

J. Am. Med. Ass., Chicago, 1918—LXXI—104.

The tonsils or anterior pillars of the fauces, the part most inflamed, is swabbed with a sterile swab, the material smeared rather thickly on a clean glass slide, fixed with heat, stained a few seconds with carbol gentian violet, washed with water and dried. The material may be smeared in serum and stained with some capsule stain, but the carbol gentian violet stains quickly and gives a perfectly clear picture.

As a rule the smear from a measles throat shows a variable number of polymorphonuclear and epithelial cells, and many small, round diplococci about 0.5 micron in length.

A smear from a rubella throat shows few if any leucocytes, but many epithelial cells, containing elongated, pointed cocci in pairs, sometimes in chains, often showing a narrow capsule. The diplococci are also seen outside the cells, but are especially characteristic when on the epithelial cells.

Smears from scarlet fever throats show many polymorphonuclear leucocytes, and a variable number of cocci, usually round, in pairs, or chains of rarely more than four, with generally a wide capsule.

The three types of diplococci described were not recognized in the thirty normal throats, except four times, when the

rubella coccus was found in persons closely associated with rubella patients. The rubella diplococcus was also observed in three of the eight cases of so-called simple sore throat, two in roommates and one in a nurse of rubella patients. These smears were made during an epidemic of rubella, and doubtless the other diplococci can be found in smears of normal throats during epidemics of measles and scarlet fever.

There is rarely much difficulty in making a diagnosis of measles, but at times it is not easy to differentiate a mild case of scarlet fever from rubella. In the Durand Hospital throat smears are proving helpful in differentiating these two diseases, especially in conjunction with leucocyte counts, as the number of leucocytes is increased in scarlet fever and reduced in rubella.

Emil Mayer.

Note on the Technic of Tonsillectomy.

BIGO.

Rev. hebdomadaire de laryngologie, etc., Paris, 1917—XXXVIII—339.

The author regards ablation by the electrocautery snare as the only method that should be employed. Total tonsillectomy he thinks unnecessary and believes that the object of the operation is attained by cutting off the overdeveloped portions of the tonsil which interfere with deglutition and respiration.

A. Miller.

Fractures of the Lower Jaw.

IMBERT, L., AND RÉAL, PIERRE.

Rev. de chirurgie, Paris, 1917—LIII—304.

War has brought the question of injury to the lower jaw and its treatment into great prominence. Following Claude Martin, the attempt has always been made to reestablish the apposition of the preserved teeth by a pseudoarthrosis. Three cases are reported where the author treated the cases by immobilization of the jaw in occlusion, in the beginning respecting the anomalous relation of the alveoli. Then, as the consolidation proceeded, the normal relations were gradually reestablished either by adjusting the apparatus of the author or by making use of intermaxillary elastic force. His conclusions are:

1. The anterior projection of the posterior fragment is a natural movement.
2. This displacement permits the coaptation of the fractured surfaces and thus facilitates consolidation.
3. The mandibular deformity which results is less to be feared, since it is perfectly compatible with almost complete integrity of mastication. This is probably due to the great adaptation of the temporomaxillary articulation.

Facts and Fancies About Tonsils.

SWAIN, HENRY L.

Med. Rec., N. Y., 1918—XCIII—1069.

In spite of every care, the luck of war will go against us, and a little one slips away from us into the other world—no oftener than the usual operative risk, but one would like to feel sure of the necessity of taking these risks which are not in the least exaggerated. In view of these, there ought to be some more exact method of deciding whether to operate or not, than merely to say inanely that we cannot find anything else to lay it to, so let us get the tonsils out.

If the tonsils are removed before the period of physiologic activity of the adenoid or third tonsil has passed, the adenoid will grow and have the same passive and functional hypertrophy of which we have spoken in the case of the faucial tonsils. The system needs it in some way, and so functional activity develops it anew.

If a tonsil is diseased it is a menace; if it is healthy, it is not. Every faucial tonsil has crypts, every crypt in every human being has a fluid filling it, especially when it is deep set, as in every large tonsil, whether healthy or unhealthy. Large protruding tonsils often are much healthier than small buried ones. These tubular cavities filled with an organic fluid contained in a warm, moist chamber are always growing a numerous and diversified flora. There could not be conceived a better breeding ground; a better culture tube and incubator for germ growth never existed. Hence in every tonsil, healthy or otherwise, pure cultures of pathogenic germs may exist, but more frequently a symbiosis of numerous germs will be present. In the living human being there can

never be for more than a moment or two a sterile tonsil crypt. crypt.

Some tonsils protect, some put up a very minimum resistance, some lie inanely down, while some actually seem to harbor disease, sedition and rebellion, and aid and abet the enemy.

Inasmuch as many tonsils require removal, when this is necessary there is no way as good nor anywhere nearly as satisfactory from every standpoint as tonsillectomy.

The writer proves the necessity for graver procedures by first trying the more conservative. By this latter he often succeeds, and this is only fair to infirm or delicate or timid folks, to do the easiest way for them. They have a right not to be dragged through the more serious ordeal when unnecessary.

In children, especially under six or eight, one should be just as thorough as is possible—if necessary reoperating, in order to get rid of all adenoid or third tonsil. Unless very large or the cause of much trouble, the faucials are allowed to remain. When the child is under the anesthetic, some operators always remove the tonsils when operating for adenoids. By simply seeing that the plica is freed from the tonsil and the tonsil from adhesion to the pillar, small unsuspected tonsils can certainly quite safely be allowed to remain and do some good to the growing child.

Every tonsil worthy of the name will at some time have thick white cheesy matter in its crypts, large ones almost always. This will almost always squeeze out when the tonsil is snared out in operation. Quite generally it appears when a tonsil is squeezed by a spud or by the edge of a tongue depressor. To accept this as the criterion for operation means that you must remove every tonsil, for, as we have just said, this probably happens at some time to every tonsil. The partitions between them will remove this tendency to accumulate and, therefore, one indication for tonsillectomy. If accumulation continues remove, but to say that because once or twice a year a simple sore throat occurs, or a bit of accumulation is found that often, is not to my mind a logical indication for removal in toto.

It would seem only fair to think that we all ought to remem-

- ber and explain to our patients that too much must not be promised or expected as a result of the tonsillar operation, for otherwise we greatly mar the splendid work done in our own circle and elsewhere to perfect the operation of tonsillectomy, doing thereby a great injustice.

Finally, would it not be a most beneficent action if by any chance some of this effort which the world over has been spent on the mere mechanical aspects of removal of the tonsil could be diverted to studying the broader question: whence come the germs which get into noses and throats and make all this trouble. They come from some given source, to be sure, perpetuated by carriers of the human variety, but is it too utopian to expect that some of the tireless workers in the laboratories may discover just this source of trouble, and as was the case with malarial parasites, also a means to prevent their growth and spread?

Emil Mayer.

Diphtheria and Diphtheria Carriers in Army Camps, as Studied at Camp Sherman, Ohio.

MCCORD, CAREY P., FRIEDLANDER, ALFRED, AND

WALKER, ROBERT C.

J. Am. M. Ass., Chicago, 1918—LXXI—275.

It appears established that the fundamental of carrier treatment is the placing of such carriers in the hands of competent throat specialists. The use of any materials, however efficacious, will not remove the organisms except on the surface of the tonsils and throat. The application of materials is only infrequently made to include the nasopharynx, and even less frequently to penetrate into the crypts of the tonsils, adenoids and perieustachian tissues. The required number of negative cultures may be obtained after the use of many antiseptic materials, only to have the organisms reappear through extension from a retained focus deep in some crypt. Cultures from the interior of excised tonsils of diphtheria carriers repeatedly have exhibited viable diphtheria bacilli when surface cultures indicated an absence of such organisms. Diphtheria carriers should be referred as a routine to a medical officer of the throat department, who will make examinations for and treat any ulcers or crypts in the tonsillar or adenoid

tissues. In case the tonsils are badly involved, tonsillectomy is the procedure of choice, and should early be resorted to. When the general pathologic condition of the throat is adequately cared for, the state of being a carrier of diphtheria may be expected to clear up under treatment with various of the above-named methods.

Beginning at approximately February 1, an effort was made to standardize the treatment of all diphtheria carriers. The administration of antitoxin to carriers was discontinued as ill advised. Medical treatment then in vogue was discontinued as unsatisfactory. Treatment was especially directed to the elimination of existing open throat lesions. Tonsillectomy was carried out in a number of cases with a quick termination of harboring diphtheria organisms in all cases. In addition, a systematic treatment with chloramin-T (chlorazene) was inaugurated. This use of chlorazene in the treatment of diphtheria carriers was anticipated by Dunham and Dakin without, however, being used in any actual diphtheria carrier cases. Its application, as we have employed it, consists in the use of an aqueous solution of 0.25 per cent strength, administered as a gargle three or four times daily. In certain cases the application was made by throat specialists to insure the reaching of remote points in the nasopharynx. The gargling was followed with an oil spray of dichloramin-T of two per cent strength. It may not be maintained that the chloramin action is exclusively responsible for the appreciable reduction of days in hospital of carriers. This is in part due to the chlorazene-dichloramin-T treatment and in part to the general painstaking systematizing of the entire care of such patients. Through the use of these several described procedures, it has been possible to return the carriers to duty after an average of twenty-three days in hospital. During the month of May the systematizing of treatment made it possible to discharge all diphtheria patients (sixteen in number) after fifteen days in hospital, and all carriers (twenty-nine in number) after sixteen days in hospital.

The authors conclude:

1. With reasonable precautions, diphtheria is unlikely to become, a serious menace to the health of army camps.
2. During the five months covered by this report, sixty-

three cases of clinical diphtheria occurred, with no deaths: 3,215 exposed persons were examined, eighty-nine of whom proved to be carriers; the number of carriers detected is 2.76 per cent of the number of exposed persons examined.

3. The employment of the system for the care and treatment of diphtheria carriers described in the foregoing has reduced the average stay in hospital for convalescent carriers from fifty-five days in the first month of this report to fifteen days in the last month of the report, with an average for the four months of twenty-three days. The period in hospital for contact carriers has been reduced to sixteen days for the last month of the report, with an average of twenty-three days for four four months.

4. The procedures described have greatly facilitated the early return of diphtheria patients and diphtheria carriers to their organization, physically fit for duties and training.

Emil Mayer.

Two Cases of Suppurative Paranephritis of Tonsillar Origin.

BOTTESELLE, R.

Riforma méd., Napoli, 1918—XXXIV—44-48.

Case 1.—Woman, twenty-three years old, was taken with pain in right lumbar region, general weakness, headache, loss of appetite and chills. Temperature varied, sometimes reaching 40° C. An abscess on the middle finger of the left hand of the size of a hazelnut was opened and readily healed. A few days later another small abscess formed below the right nipple and was soon cured after incision.

Diagnosis: Right paranephritis. Examination: Slight enlargement of cervical axillary and inguinal glands; tonsils hypertrophied and of reddish color; palpation showed an ovoid swelling in region of right kidney. Examination of blood: Red cells, 4,600,000; leucocytes, 12,000; polynuclear neutrophiles, 82 per cent. Urine amber yellow; urea, 11.50 per cent; albumin, 15 per cent. Diagnosis: Purulent paranephritis on right side. Operation: Posterior surface of kidney was free, kidney not enlarged, abscess found anterior, close to the hilum. Incision relieved about 100 cubic centi-

meters of pus. Bacteriologic examination showed streptococcus pyogenes. Patient recovered.

Case 2.—Girl of eighteen years. One morning on rising from bed felt violent pain on the left side with chilliness, then fever. Pain increased, fever reached 40° C. Examination: Tonsils were hypertrophied, crypts being filled with detritus. Right renal region was very sensitive to touch. Radiograph showed diffuse shadow in the right renal region. Blood: Hemoglobin, 85 per cent; leucocytes, 14,000: polynuclear cells, 80 per cent. Diagnosis: Suppurative paranephritis on right side. Operation: A large abscess on the posterior surface of the kidney was incised. Bacteriologic examination showed staphylococcus pyogenes aureus. Patient recovered.

What was the starting point of the microorganisms in these two cases? The tonsils, by their anatomic structure, are a common portal of ingress for microorganisms. As the germs in these cases were not specific they must have found their way from the tonsils to the kidney through the circulation. The first patient had a short acute tonsillitis two months before the trouble appeared. In both cases chronic hypertrophy of the tonsils was present. In neither of the two cases could a previous cutaneous lesion be ascertained.

The Buccopharyngeal Manifestations of Typhoid Fever.

BERGOLLI, F.

Riforma méd., Napoli, 1918—XXXIV—264-267.

The first to describe typhoid ulceration of the throat was Bouveret in 1876, but it was little known until much later. There are five forms of buccopharyngeal changes in typhoid:

1. A simple redness with a certain edema of the pharynx, sometimes accompanied by swelling of the tonsils, which occurs frequently at the beginning of the disease. It is most frequently met with during the winter season.

2. In typhoid fever, especially if the case is serious, the tongue and the lips become dry and are covered by a crusty layer. There is sometimes also a severe inflammation of the soft palate and pharynx, characterized by an extreme dryness. This form may be called the crustomucous form. It is almost exclusively under these conditions that the pseudomembranous

anginas develop. The agent may be the diplococcus of Fraenkel or the streptococcus. In case of the streptococcus the condition is accompanied by an abundant mucous secretion. The association of diphtheria with typhoid was mentioned by Joltrain in 1915.

3. A third form of changes in the throat during typhoid consists in miliariform vesicles which appear on the hard and soft palate. They are only noticed if the mouth is well lighted up by an electric lamp. They are not surrounded by inflammatory areas and are not painful.

4. A fourth form is the true angina of Duguet. It is not frequent. It consists in one or multiple ulcerations, generally localized on the upper portion of the anterior surface of the anterior pillars and on the uvula, rarely on the posterior pillars. The ulcer is superficial, ovoid, with a red border, a grayish base, without a false membrane.

5. The last form comprises those rare cases in which we observe, especially on the hard palate, punctate or lenticular spots of an intense red color, which disappear on pressure and somewhat simulate roseola.

These conditions were found 108 times in 400 cases. Bacteriologically 40 cases belonged to the typhus bacillus, 16 to paratyphus B., 9 to paratyphus A., and in 43 cases the germ could not be ascertained.

Hemorrhage From Tonsillectomy.

AIEVOLI, E.

Riforma méd., Napoli, 1918—XXXIV—327.

Statistics show that hemorrhage after tonsillectomy is not frequent. Wright noted, from 1868 to 1890, among 3,000 cases only one case of serious hemorrhage, and in the succeeding years he saw 54 cases, one of which was fatal. Browne had among 50,000 cases only four or five cases of grave hemorrhage.

As the tonsillar region is traversed by important vessels (facial, lingual, internal maxillary arteries), it is quite possible that hemorrhage may be due to abnormalities of the blood vessels—i. e. (1) of the tonsillar artery and its branches; (2) of the ascending pharyngeal, (3) of a branch of the de-

scending palatine, (4) of a branch of the ascending palatine, (5) of a branch of the dorsal artery of the tongue found in the lower part of the tonsil and external pillar, (6) of capillary branches of the anterior and posterior pillars, (7) of an enlarged venous plexus on the inferior external border of the tonsillar crypt, (8) of the internal carotid.

Predisposing causes are acute tonsillar inflammation, anemia and leukemia, cardiac and renal disease, menstrual and pregnant stage, adult stage, male sex, hemophilia and purpura, fibroid state of tonsil, arterioles losing contractility, malignant growth and anomalous course of blood vessels.

From these causes it is clear that the cases for tonsillectomy should be carefully selected. Some writers have used prophylactic means: adrenalin, injection of hypophyseal extract, serotherapy. But a prophylactic measure is also the operative method selected. Short anesthesia with ethyl chlorid has been advised. A successful method is the removal of the tonsil by the hemostatic guillotine, an instrument much improved by Willis, Ballenger, Howard and others. But in spite of these various methods, cases of hemorrhage will occur. In such cases Moore advises hypodermic injection of morphin and atropin. Calcium lactate and calcium chlorid are used per os and per rectum. Adrenalin is good at first, but predisposes to secondary hemorrhage. Pituitrin is of great value. Hypodermoclysis and phlebotomy have also been used.

A Case of Ludwig's Angina.

BLASI, G.

Policlin., Roma, 1918, sez. prat., XXV—134.

Boy, ten years old, with dental caries. An attack of toothache was followed by high fever and swelling under the chin, which spread to the neck and cheeks. Delirium was present at night, also insomnia; respiration was accelerated; there was almost complete aphonia, as well as dysphagia. Examination: Floor of mouth bulging. Outside pressure under chin caused pus to exude from a premolar tooth cavity. The pus must have found a way through the body of the mandible, through

the pervious root canal and through the carious dental cavity. Diagnosis of sublingual abscess being made, the abscess was opened by a large transverse incision under the chin. The pus was evacuated, antiseptic irrigation used, drain inserted. On next day the swelling had greatly subsided on the right side, but increased on left side. A second incision was made, extending the first one to the left, following the border of the maxilla. Congested and swollen submaxillary glands were exposed. A sound was passed behind the gland to the parotid region. Patient recovered.

Dark Field Study of Five Cases of Pseudomembranous Oral Infection Diagnosed Clinically as Vincent's Angina, at Base Hospital, Fort Dodge, Iowa.

BRUMBAUGH, ARTHUR S.

Survey of Head Surgery, Office of Surgeon General, U. S. A., Washington, 1918—I—45.

Case 1.—White, age twenty-two years. Soreness of the mouth dates from the extraction of a molar tooth one month ago; dysphagia but no pain; smokes considerably but teeth are sound and clean. The lesions consist of several grayish white patches on the right tonsil and a large patch of similar color involving the right side of the soft palate, extending to the gum of the upper jaw and the cheek, having a sharply defined margin and a narrow reddish zone of hyperemia around it. The base of the ulcer bleeds readily when the membrane is scraped off. The lymph nodes at the angle of the jaw on both sides are enlarged, especially on the right. The axillary and inguinal glands are moderately enlarged and easily palpable. A pigmented scar is found on the shaft of the penis. The patient claims it was caused by chancroid one year ago. His skin is clear of eruption.

Wassermann Test.—Negative.

Throat Smear.—Stained preparations showed the presence of the spirochetes and fusiform bacilli characteristic of Vincent's angina. Dark field examination of secretion from the lesions revealed the presence of enormous numbers of motile

fusiform bacilli and coarse coiled spiral organisms, both forms being very active and darting across the microscopic field so rapidly that their morphology could be distinguished only when they are slowed up at clumps of cells or débris in the preparation.

Diagnosis of Ward Surgeon.—Vincent's angina.

Dark Field Diagnosis.—Vincent's angina.

Case 2.—White, aged twenty-three years. His sore throat is of three weeks' duration. Pharynx and palate are granular and red, and scattered patches of grayish exudate are present on the postpharyngeal wall and right tonsil. The gum about the two posterior lower right molars is reddish, swollen, projecting above the teeth and covered with grayish membrane. The lymph nodes at the angle of the jaw are moderately enlarged; the inguinal and axillaries are also readily palpable. Patient denies venereal infection. There are no scars on the genitalia and the skin is clear. He smokes tobacco rather immoderately. The teeth are clean and free from caries.

Wassermann Test.—Negative.

Throat Smear.—Stained preparation shows the presence of Vincent's organisms.

Dark field examination reveals very numerous coarse coiled spirochetes and a few fusiform bacilli, both forms very motile.

Diagnosis of Ward Surgeon—1. Tonsillitis, acute follicular.
2. Vincent's angina, right tonsil, moderately severe.

Dark Field Diagnosis.—Vincent's angina.

Case 3.—White, age twenty-three years. His sore throat is of ten months' duration. Lesions consist of a granular ulceration of the soft palate, having a reddish base, with scattered irregular areas of grayish pseudomembrane. He smokes moderately and his teeth are good and clean.

Throat Culture.—Showed bacillus diphtheriæ absent; a few hemolytic streptococci present.

Throat Smear.—Stained preparation three months previously showed Vincent's angina organisms. Two weeks ago none was present.

Wassermann tests, made respectively two months ago and three months ago and at the present time, are all negative.

Dark field examination revealed rapidly motile fusiform bacilli and coarse coiled spirochetes.

Diagnosis of Ward Surgeon.—Vincent's angina, severe, involving the fauces and soft palate.

Dark Field Diagnosis.—Vincent's angina.

Case 4.—White, age thirty-one years. His sore throat began six weeks ago. Both tonsils and soft palate are covered with a grayish white membrane, marked off with a narrow hyperemic zone. The lymphatics at the angle of the jaw and the postcervical chains are enlarged. The inguinal lymphatics are slightly enlarged. The patient is obese, weighing two hundred and five pounds. He has several scars on the penis, which he attributes to soft chancres six weeks ago. His skin is clear. He complains of rheumatism of the ankles. He smokes very rarely. His teeth are clean and free from caries.

Throat culture showed hemolytic streptococci.

Throat Smear.—Stained preparation showed presence of Vincent's angina organisms, Gram positive diplococci and diphtheroid bacilli.

Wassermann test, made recently, was negative.

Dark field examination reveals the presence of a very few typical *treponema pallida* and a few Vincent's organisms.

Diagnosis of Ward Surgeon.—Vincent's angina.

Dark Field Diagnosis.—Secondary syphilis.

Case 5.—White, age twenty-two years. His sore throat is of six months' duration. He smokes considerably. His teeth are slightly tobacco stained and he has two carious molars. Otherwise his teeth are in good condition. The lesions consist of grayish white patches on the soft and hard palate, the lateral and inferior surface of the tongue and on the lower lip. They have smooth serpiginous margins and a very narrow zone of hyperemia about the palate lesion, but none around the tongue and lip lesions. The membrane is tightly adherent and does not bleed readily if the surface is rubbed. He denies venereal infection and the skin of the body is free from eruptions. The glands at the angle of the jaw are markedly enlarged. The axillaries and inguinals are also moderately enlarged. The genitalia are free from scars.

Throat culture one week previously showed bacillus diphtheriae absent.

Throat Smear.—Stained preparation showed Vincent's angina organisms present.

Wassermann test one week previously was mildly positive.

Dark field examination revealed a few typical *treponema pallida*.

Diagnosis of Ward Surgeon.—Acute catarrhal pharyngitis and Vincent's angina.

Dark Field Diagnosis.—Secondary syphilis.

COMMENT.

The differential diagnosis of these cases clinically and by the usual laboratory procedure, without dark field, presents many difficulties and may be impossible. The lesions of true Vincent's angina and secondary syphilis are quite similar, the pseudomembrane has the same grayish white appearance and the location and appearance of the lesion and glandular enlargement are by no means characteristic. Even the Wassermann test may be misleading, as in case four, which gave a negative Wassermann test, yet the lesions contained the *treponema pallidum*. In case five, the mild positive Wassermann test still left the case in doubt as to whether it may not have been a case of Vincent's angina developing in a mild or chronic case of syphilis, which doubtless was the opinion of the ward surgeon.

In these doubtful cases the dark field examination will prove of great advantage in clearing the diagnosis. The presence of the *treponema pallida*, even in small number, is pathognomonic of syphilis. The same cannot be said of Vincent's angina organisms, as they are fairly constant inhabitants of the mouth, especially about carious teeth. However, the presence of a large number of coarse coiled spirochetes and fusiform bacilli is regarded as the causative factor where the *treponema pallidum* is absent. The motility of the Vincent's organisms is distinct from the *treponema pallidum* under the dark field; the spirochete and fusiform bacillus have a rapid, darting movement across the microscopic field, the Vincent's angina spirochete having also a rapid rotary motion on its long apex. The *treponema pallidum* likewise rotates on its long axis, but does not have such rapid movement of translation, and does not so rapidly move out of the field of the microscope.

The cooperation of Major Frank E. Burch, M. R. C., in presenting these cases for study and furnishing clinical data is hereby acknowledged.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Foreign Bodies in the Larynx (Leeches).

NAVARRO.

Rev. hebdomadaire de laryngologie, etc., Paris, 1917—XXXVIII—290.

Navarro has had more than a hundred cases of a leech in the larynx. The trouble is most common in Andalusia and Cordova, Spain, where during the summer months ignorant agricultural laborers often drink hastily from ditches. At the moment of deglutition the animal as a defensive measure attaches itself within or about the larynx. Symptoms vary, of course, according to the site of attachment. Hemorrhage by mouth is a constant symptom, the blood being partly filled and partly half digested clots. Loss of blood may lead to marked anemia. According to the point of attachment, the special symptoms vary from none at all to imminent asphyxia. On laryngoscopic examination, the leech may be found on the edge of the epiglottis, or on its posterior surface, or either commissure, or on the cords or below them. One of Navarro's cases was that of a woman, aged seventy years, who had an enormous leech attached to the anterior commissure so that its body acted as a valve, almost preventing respiration. Treatment is by extraction with the Krause forceps. Navarro warns against cocainization, as the animal may release its hold and drop further into the larynx or trachea. Some of his colleagues, however, use cocaine in strong solution, so that the leech relaxes and can then be expelled by the patient's coughing.

A. Miller.

Endolaryngeal Ecchymosis Following Contusion of the Larynx by Shock.

LIEBAULT.

Rev. de laryngologie, etc., Paris, 1917—XXXVIII—337.

A sublieutenant was wounded in the face and neck by a reflected bullet. When seen he was aphonic and complained of laryngeal pain and slight dyspnea. On the left side of the neck was a superficial wound of the skin. The larynx seemed to be pushed over to the right. Palpation produced a little

pain, but no crepitus or sign of emphysema. Laryngoscopy showed a diffuse redness of the larynx; the left ventricular band was markedly swollen and ecchymotic; vocal bands normal and without paralysis. In a few days the swelling of the ventricular band became of a violaceous hue, then disappeared, and the voice was regained. This is the only case of the kind that Liebault has seen during the war.

A. Miller.

Luetic Paralysis of Right Vocal Cord.

DAVIS, GEORGE E.

Laryngoscope, St. Louis, 1917—XXVII—895.

The writer presents a case of patient, twenty years old, with sore throat, speaking and swallowing difficult, voice husky, enunciation indistinct. The soft palate was drawn up, uvula displaced, midway between center and left tonsillar pillar. Pharynx and tonsils not inflamed, though the tonsils probably were the seat of infection. There was paralysis of the right vocal cord and right side of the pharynx and larynx.

Family history revealed father's death at the age of fifty-four, of Bright's disease, mother's at the age of thirty-four years, of pulmonary tuberculosis. Two sisters and one brother are living. When ten years old the patient had a severe illness, either typhoid fever or meningitis, followed by deafness in the left ear. The right ear showed low notes normal, but high notes lowered at times; stuffiness and tinnitus in right ear. Hypertrophy of the thyroid, more on the right but not enough pressure on recurrent laryngeal to produce paralysis of the cord. Diminished muscle tonus of right arm and leg, and reflexes on right. Total deafness on left and shortened right bone conduction led the writer to conclude that there was a luetic origin of paralysis; this was confirmed by a plus four Wassermann.

Wright and Smith say: "Cortical tumors, hemorrhages, degenerations, meningeal inflammations and cranial depressions are hardly regarded as causing laryngeal paralysis, but may be associated with central lesions due to syphilis."

As proven by clinical experience, the seat of luetic lesion

responsible for laryngeal paralysis is in favor of the fourth ventricle. Paralysis in present case showed that a unilateral lesion in the bulb may cause a unilateral paralysis of the cord on the same or opposite side, depending on whether the lesion is about or below the decussation of the nerve supply. The loss of ear function may have been peripheral, affecting the end organs of the eighth nerve. The loss of ear function appeared ten years before the present clinical pharyngeal and laryngeal symptoms, the date of the anatomic lesion of laryngeal paralysis is questionable. The abductor nerve supply is the first to go in progressive lesions, and unilateral median position of the cord does not affect the voice and respiration at the initiation of the paralysis, therefore sudden and difficult vocalization and deglutition are not proof of the simultaneous occurrence of the paralysis.

The writer concludes that the paralysis is of long standing and the sudden symptoms were due to acute cold.

J. A. Stucky.

Swallowed Thread as Guide in Instrumentation of Narrowed Esophagus; Report of Case of Cardiospasm in Which Method Was Employed.

WHITEFORD, C. H.

Practitioner, Lond., 1918—C—81.

Report is made of a case of strictured and dilated esophagus treated after the method of Dr. H. S. Plummer, who has perfected the technic of Mixter's modification of Donham's method of having patient swallow a string as guide for later passage of sounds. Dr. Hamilton quotes Dr. Plummer's two rules of safety: "First, that the tip of the instrument must be constantly under guidance of vision, or that the instrument must follow a guide in such a way as to make perforation of the esophageal wall with its tip impossible." For the first the esophagoscope is necessary. For the second an olive tipped sound perforated from apex to shoulder for the passage of the thread is necessary. In the reported case a thread fifteen feet long reached from the incisor teeth to the anus. The sound was kept under vision by the fluorescent screen. This enables operator to be sure of entry into stomach.

E. R. Holmes.

An Implantation Cyst of the Larynx.

DEAN, L. W., AND GREGG, J. B.

Laryngoscope, St. Louis, 1918—XXVIII—74.

Implantation cysts are caused by punctures from awls, forks, needles, thorns, glass, etc., causing intrusion of the epithelial cells into submucous tissues. They vary in size and look like inverted skin covering. The writers have not found a case of implantation cyst of the larynx in any literature. The ordinary cysts of the larynx are found in anterior surface of epiglottis, within the larynx, on the true cords, as large as the epiglottis, or on the lateral wall. They may be very small on the cords or large, as on the epiglottis. They are of two kinds: (1) Glandular cysts, rare in the larynx and due to the dilatation of the gland acini and ducts. The nature of the growth being difficult to determine. (2) Connective tissue cysts, due to localized effusion of serum under epithelium, between it and the stroma, making a protuberance which collapses if punctured. Or the cyst may be traversed by fibrous threads and bands.

A detailed history of an interesting case is given.

In all cases of tumors of the larynx it is well to consider diagnosis of implantation cysts of the larynx.

J. A. Stucky.

Lymphangioma of the Larynx.

RICHARDSON, CHARLES W.

Laryngoscope, St. Louis, 1918—XXVIII—8.

In this paper the writer says the number of such cases reported is forty-one, and none presented the physical or gross appearance as the one shown by him. The patient, a man thirty-two years old, was seen by family physician, who found him with difficult breathing and deglutition. Ten years before, his voice became muffled and a laryngoscope examination showed tumor in larynx. The writer's examination showed voice muffled, breathing fairly easy, but the patient threw his head up frequently, making an empty swallow, which he said made him breathe easier. He complained of

inability to ingest food. His breathing became embarrassed during deglutition, he feared table food, and lost flesh rapidly. The choking was worse at night, causing loss of sleep. There was nothing abnormal in the nose and fauces. When the larynx was examined a large bluish gray mottled mass appeared, filling the supracordal portion of the larynx. It was round, smooth, without ulceration, soft and pultaceous. The deeper portions of the larynx were visible. Its origin was from the right false cord, the ventricular wall extending to the aryepiglottidean fold and posteriorly to the arytenoid. It rested on the left false cord and extended on a level with the left aryepiglottidean fold. The peculiar movement of the head raised the growth allowing more air to pass through space opened. The writer concluded that the growth was not malignant. If carcinomatous, it would have shown ulceration. If melanosarcoma, it would have been fatal. And while it resembled angioma it had no history of hemorrhage. After cocainizing the larynx, a laryngeal knife plunged into the mass caused trivial loss of blood. Both larynx and pharynx were cocainized with a twenty per cent solution of cocain. The snare wire would not slip below the growth, so it was engaged by the left index finger and introduced into the larynx, raising the mass. This caused slight bleeding. The growth was a large pultaceous mass of blue gray mottled appearance, five centimeters long, containing lymph or venous sinuses with bloody thick fluid flowing. Microscope showed that the neoplasm was composed of firm fibrous tissue, the interior arranged in branching and villous form, enclosing cavernous sinuses which were lymph sinuses. It was covered with stratified, squamous epithelium. Blood vessels were numerous in the periphery. Extravasations were present in fibrous structure, containing pigment granules. The fibroblasts were aggregated at a few points. The tumors might be called a hemorrhagic cavernous fibroma or lymphangioma. It was interesting because of the unusual size, of the laryngeal neoplasm, its color and gross appearance, the absence of difficult breathing with so large a neoplasm filling the vestibule of the larynx. The true angioma is removable only by laryngofissure. The endolaryngeal removal is too dangerous on account of uncontrollable hemorrhage.

The end results of this case will be watched with interest.

The abstractor had a case similar to this one, with return of the growth in less than two years, resulting in death from inoperable lymphosarcoma with metastasis.

J. A. Stucky.

Mechanical Spoon for Esophagoscopic Use.

JACKSON, CHEVALIER.

Laryngoscope, St. Louis, 1918—XXVIII—47.

Friable substances such as meal with kernels and substances too large to be grasped with forceps, are better removed with a mechanical spoon constructed like the author's safety pin closer, which is satisfactory. The spoon has been made a larger, shorter, heavier model for use in the esophagus below the cricopharyngeal constriction. Illustrations are given of the model.

J. A. Stucky.

Stammering.

TOMPKINS, ERNEST.

Med. Rec., N. Y., 1918—XCIV—62.

Whether the stammerer's nervousness is antecedent or resultant is a much discussed phase of the disorder. Temporary nervousness following shock or illness is a great inducing cause, and that has been considered permanent without due warrant. That the extended nervousness is resultant ought to be evident; for the disorder is a constant mental torture, and any animal can be made nervous by constant torture.

There are very many reasons why heredity cannot be accepted in the case of stammering; no satisfactory evidence of it has ever been presented; some of the alleged proofs of it turn out to be positive disproofs when they are examined; and no theory of the disorder involving heredity has ever been sustained.

Health and stigmata of maldevelopment may be considered together. It is unquestionable that stammerers have ailments just as other people do; but no connection between those ailments and the stammering has ever been shown.

As to treatment: The speech interference theory gives us the etiology, the common causal factor, the causes of origin by imitation, sex discrepancy, and many other features which are every day pronounced unknown. Indeed, it satisfies every requirement, so, in the words of Haeckel, "we are bound to adopt it"—that is. some of us who are scientific.

Emil Mayer.

Acute Primary Perichondritis of the Larynx.

CANUYT, GEORGES.

Rev. de laryngol., etc., Paris, 1918—XXXIX—49.

Under the designation of acute primary perichondritis of the larynx is included a morbid state characterized by the acute inflammation of the cartilages of the larynx.

Acute or chronic inflammations of the cartilages of the larynx may be encountered in many diseases affecting the larynx, more or less serious, such as syphilis, tuberculosis, etc., or even in the course of certain types of laryngitis accompanying eruptive fevers. These, however, concern secondary perichondritis, which is described under the head of bacterial and syphilitic laryngitis. Likewise following a traumatism and especially a war wound, perichondritis is an almost invariable complication when the cartilages of the larynx have been injured. It then concerns a secondary traumatic perichondritis. These several types of perichondritis are secondary to a general infection or to a traumatism; the perichondritis then is only a step in the inflammatory or ulcerative process.

On the other hand, primary perichondritis deserves to be studied and described. This affection, whose existence is denied by some authors and ignored by the surgeons and most of the specialists, exists unquestionably, according to the testimony of Moure, Macdonald and Lenox Browne. We have had the opportunity of observing several cases. It is a rare and often very serious disease.

Acute inflammation of the cartilages of the larynx may have two entirely distinct aspects: the circumscribed form and the diffuse form.

(a) **Circumscribed Form.**—The symptoms which accom-

pany the evolution of circumscribed laryngeal perichondritis are at once severe pain as the dominant symptom; the patient holds his hand at his neck; has spontaneous pain, which is increased by swallowing. The voice is always hoarse, sometimes choked, but the phonetic disturbances vary. The cough, which is dry at first, finally becomes rough, depending on the state of the larynx. Respiration is normal—in fact, in the circumscribed forms the lesions are localized at the level of the thyroid region of the vocal organ; there are no respiratory symptoms.

On external examination the patient stiffens his neck, which is increased in size, for the thyroid cartilage is swollen and deformed, the natural projections are effaced. On palpation the perichondritis is limited to the lamellæ of the thyroid cartilage. There is a more or less regular swelling at its surface which may be on one side or bilateral. Exploration of the affected region shows a very severe pain localized in one of the plates of the thyroid. When the finger is placed upon the larynx or the trachea a very notable increase of the vibrations is noticed, due to the movement of the inspired or expired air on the infiltrated and rigid walls. When the patient speaks in a loud voice the sensation of an increase of laryngo-tracheal vibrations is more easily observed. The infection is especially marked at the level of the external perichondrium. Macdonald insists on what he calls the agglomeration toward the median line of all the tissues of the larynx under the pressure of perichondrial swelling.

Laryngoscopic Examination.—Some roughness and a slight swelling of the vocal mucosa will be found.

According to Lenox Brown, when the thyroid cartilage is affected unilaterally, more or less hyperemic swelling of the ventricular band of the affected side is found.

In the course of this acute infection of the laryngeal cartilages the infiltrated cartilage sometimes takes the aspect of a carapace, as in cancer of the larynx when the tumor infiltrates the thyroid shell. Often when the swelling is localized the skin is distended by a purulent collection, more or less abundant, which raises it, attenuates it and may even perforate it.

The perichondral abscess thus formed is seen externally.

and the existence of denuded or partly necrosed cartilage may be recognized by means of a probe. Finally, this cartilage will be extruded through the fistulous tract which follows the opening of the abscess. It is even possible to remove at the beginning the sequestrum contained at the bottom of the abscessed cavity. Thus the fragments of the thyroid or of the cricoid which are affected by perichondritis then necrosed may be thrown out spontaneously.

But necrosis is not the necessary consequence of perichondritis, and Lenox Brown states that it is not uncommon for this inflammation to resolve without loss of substance.

The general signs are always marked. The patient has a tired look from suffering and lack of food; the temperature is high, and the pulse always rapid. Circumscribed laryngeal perichondritis evolves as an abscess localized in the thyroid or cricoid region; the perichondrium is inflamed, then the cartilage is necrosed, while the peripheral tissues are infiltrated, deformed and opened externally if the surgeon has not intervened soon enough to give outlet to the purulent collection which is formed—that is to say, in the course of several days or even of several weeks.

The prognosis of this clinical form is considered relatively benign. The patients recover with loss of a portion of the cartilage. The loss of substance is seldom severe enough to result in an appreciable deformity of the vocal organ, as in certain tubercular or syphilitic perichondritis or the types following eruptive fevers or fractures or wounds of war.

(b) The Diffuse Form.—The onset is abrupt, like that of a marked infection. The pain, as in the preceding form, constitutes the main symptom; it is spontaneous, very severe and occasions much complaint from the patient. Deglutition is painful from the time the larynx begins to rise; it can either become extremely difficult or even impossible if the perichondritis is generalized, the cartilaginous passage being moved only with the greatest difficulty. In the beginning these painful phenomena dominate in some way all the other functional symptoms. Great importance should be attached to a sudden pain in the anterior cervical region.

Respiration, which is normal at first, may finally become very painful—in fact, when the motility of the infiltrated ary-

tenoids is affected dyspnea appears and may become most intense.

Respiratory disturbances, almost lacking in the circumscribed forms, are manifest in the diffuse forms, by a very pronounced stenosis due to the infiltration and swelling of the laryngotracheal tube, even to the concomitant edema.

There may be phonetic troubles if the swelling of the cords and their state of asynergy prevents their vibration or prevents their normal tension. Speech being painful, the patient talks in a low voice and seems to have a true phonophobia.

Upon examination, the lesion localized in the beginning in the thyroid cartilage is found to extend rapidly to the entire laryngotracheal passageway. The neck of the patient has an infiltrated appearance, stiff, moving with difficulty. In these cases the trachea may have such a volume that it reaches the sternum.

On palpation, all the prelaryngeal tissues from a solid attachment to the larynx; but in spite of the swelling it is easy to note that the injury belongs to the thyroid cartilage and not to the thyroid body, which is an important factor in the differential diagnosis. In fact, the thyroid lamellæ are very painful, the larynx is increased in volume, but the thyroidal lobes do not participate in the infection, or but little.

On laryngoscopic examination, generally difficult, diffuse roughness is noted and more or less marked swelling of the arytenoids and the ventricular bands. Rarely, the epiglottis is infiltrated. The vocal cords are stretched and come together badly, causing the stifled character of the voice. In this diffuse form, contrary to the circumscribed one, the formation of a purulent collection is exceptional. The entire laryngotracheal tube and perhaps even the first bronchial divisions are tumefied and infiltrated, and the patient succumbs after three or four days of illness, without any intervention whatever possible to save his life, which from the beginning was threatened.

These are cases of perichondritis, truly dreadful, fortunately rare, against which we are very poorly equipped. It is a sort of woody phlegmon evolving the laryngotracheal passage and the tissues around it, capable of extending as far as the

mediastinum; it resembles those fatal phlegmons of the subhyoidal region in which the pus has not had time to form.

The general phenomena are well marked, and from the beginning the temperature ranges from 38° C. to 40° C., and even to 41° C. in severe forms. The patient suffers from fatigue, anorexia, and has in his face the imprint of a deep infection. His state becomes rapidly desperate. In fact, diffuse perichondritis at the first onset invades the entire laryngo-tracheal passage. It is very serious, for in several days a purulent collection more or less abundant is produced, and a rapid decline of the patient, who is quickly carried away by the hectic fever and bronchopulmonary infection. This description indicates the difference between the evolution of benign circumscribed perichondritis and that of the well diffused and fatal type.

The prognosis is almost always fatal. From the onset the patient is stricken with death, with some rare exceptions.

Two observations are reported of serious primary laryngeal perichondritis. The history of the first patient, as reported by Professor Moure, shows the gravity of the affection; the second case is as reported by the writer.

Case 1.—Mr. X., twenty years old, in military service, came to the infirmary complaining of pain in his throat, discomfort in swallowing, and general fatigue. The doctor who examined him, having found nothing abnormal, put the patient to rest for twenty-four hours. The next day, the troubles having increased, the young man went to the infirmary, where they found symptoms of grippe. He had pain in swallowing and even in speaking; he suffered violent pains in the nasopharynx, had a rather dry cough, and a generally poor condition.

The symptoms continued to increase; his temperature was 40.4° C. The facies was anxious, his neck hard to move and slightly swollen in the anterior region.

The family of the young man obtained permission for him to go home, where his regular physician cared for him. At that time the patient was in a bad general condition, the temperature ranging from 39° C. and 40° C., a slight roughness in his voice, difficulty in swallowing and pains in the neck. No pain in respiration, but respiration slightly hissing.

Forty-eight hours afterwards, the symptoms continuing to increase, the doctor called Professor Moure in consultation. At his arrival the patient was found suffering from fatigue, anxious facies, a roaring respiration; a temperature of 40° C. His neck was rigid, moved with difficulty and was extremely painful on pressure. On palpation it was impossible at any place to define the area which separates the thyroid from the cricoid, and the latter from the trachea. The laryngotracheal passage was transformed into a rigid swollen tube resting on the sternum, over which it projected slightly. It resembled a woody phlegmon of the anterior part of the neck, making movements of deglutition almost impossible.

The pulse was weak and thready, as in serious infections.

In the presence of this situation, which seemed very serious, the author made the diagnosis of laryngotracheal perichondritis of grippal origin, and the seriousness of the prognosis was not concealed.

Inhalations were prescribed, some injections to improve the general condition, but the symptoms increased, and forty-eight hours after, the patient succumbed without presenting real respiratory symptoms which would have suggested tracheotomy, and also without any formation of pus in the anterior region of the neck, which was always woody and very painful.

This was a very rare example of diffuse primary laryngotracheal perichondritis, the diagnosis of which was most difficult at the beginning, and against which a treatment as energetic as it was, remained absolutely inefficacious.

Case 2.—Acute Primary Laryngotracheal Perichondritis; Recovery.—An Arab who complained for five or six days of pains in the level of his neck was sent to Professor Moure, because the functional signs were increased in acuteness and general signs began to appear.

On examination, the patient was found fatigued, downcast and suffering great pain in swallowing his saliva. The subhyoid region was tumefied, stretched, of normal coloring, and on palpation a thickening was felt reaching from the hyoid bone to the sternum, which obliterated the grooves and ordinary anatomic depressions. In fact, all the spaces of the anterior region of the neck had disappeared, and the thyroid and cricoid cartilages and the trachea seemed a hard and tense

block. At the inferior part the trachea touched the posterior part of the sternal notch. Palpation exhibited exquisite suffering, especially at the level of the thyroid. In other words, there was a diffuse thickening which included the thyroid body and the laryngotracheal region.

On laryngoscopic examination the aryepiglottic folds were found red and tumefied, and the entrance of the larynx was filled with purulent mucus.

The patient had a temperature of $38.7^{\circ}\text{C}.$; pulse, 130; infrequent urination, with albuminuria; general condition unsatisfactory. The prognosis was very grave. The treatment was as follows:

(a) Local.—Fumigations, warm damp dressings and belladonna ointment over subhyoid region.

(b) General.—Intravenous injections of camphor water, collargol and electrargol.

In the succeeding days progressive and continuous amelioration was manifest by a diminution of suffering, an abundant diuresis, a better local state, a retrogression of the general phenomena.

At this time the patient, who had caused us uneasiness, was out of danger, and eight days after he was dismissed as cured.

Diagnosis.—The following questions are to be answered:

1. Is there perichondritis? If so,
2. Is the perichondritis secondary or primary?
3. If it is primary, is it a localized benign form, or diffuse and serious?

Differential Diagnosis.—Perichondritis must not be confused with the following affections:

(a) Prethyroid Adenitis.—Well studied and described by Liebault, it begins ordinarily in the anterior part of the neck at the level of the portion corresponding to the angle of the thyroid cartilage. If there exists at the level of the thyroid cartilage a tumefaction giving the sensation of a diffuse fluctuation, it is difficult at this period to make the differential diagnosis between perichondritis and prethyroid adenitis. It should be remembered that the latter has a slower evolution and has no general phenomena. In adenitis palpation is not at all painful; on the other hand, the skin, more tense and thinned, has a more spread and diffuse violet coloring than

in perichondritis. When the cartilage is affected it is only at the point where the opening of the abscess is made that the skin is thinner and takes the reddish coloring characteristic of a certain infection. When a perichondritic abscess is opened there is a more or less free discharge of pus, and the sound or curette introduced in the cavity shows the presence of a denuded cartilage, rough, necrosed in part. In prethyroid adenitis the tumefied pouch contains hardly anything but soft fungosities surrounded by a sort of discharge more or less purulent, as is found in suppurated adenitis; often the pus is grumous as in the latter case, and the cartilage is still covered with its perichondrium slightly red and thick; the subjacent muscles are intact; the sound strikes soft and infiltrated tissues and not denuded and diseased cartilage.

In résumé, the lesion of adenitis is superficial; that of perichondritis is deep.

The laryngoscopic examination is negative.

(b) Acute Thyroiditis.—This affection is localized in the thyroid body. The tumefaction assumes more the form of the isthmus and the thyroid lobes stretching more to the side. But at the anterior part of the neck above the thyroid, the thyroid cartilage, the cricoid and especially the Adam's apple, are perceived at palpation; they are brought to the same plane as in perichondritis, and they do not comprise the diffuse mass that has been described.

On the other hand, this characteristic is important; the laryngoscopic examination is absolutely negative.

(c) All acute affections of the subthyroid region.

Logically they must be eliminated, as in all anatomic diagnosis they must pass in the theoretic review. Practically mistake can be made only with prethyroid adenitis, and especially with acute thyroiditis.

But it must be determined whether the perichondritis is secondary or primary.

TYPES OF SECONDARY PERICHONDRITIS.

(a) Tubercular perichondritis is preceded and accompanied by characteristic laryngeal lesions. In fact, this complication comes only at the third period—that of perichondritis or necrosis. The ulceration increases in depth and affects the car-

tilage and perichondrium, constituting the stage of caries and necrosis, according to Lambert.

(b) Syphilitic perichondritis is characterized by a limited inflammatory zone which increases the dimensions of the vocal organ, and a cartilaginous necrosis with increase in the volume of the perichondrium. In certain forms the cartilage and the perichondrium are invaded first, and ulceration is secondary. Then there is a very rapid disorganization of the structure of the larynx.

In these forms of perichondritis the tumefaction is visible externally, and this special characteristic of perichondritis is common. It cannot be confused with primary perichondritis, for even if inspection and palpation give the same result, the evolution of syphilitic perichondritis is slow, not painful, and laryngoscopic examination shows the signs of the process.

(c) Neoplastic perichondritis is a terminal complication. In fact, the patient has come to the period of painful respiration, of cachexia and of exteriorization of the neoplasm. In this stage the tumor breaks the limits of the larynx and attacks the cartilages, the ganglia, etc. The vocal organ is entirely enclosed in a thick mass, adherent and voluminous. Confusion is not possible.

(d) Secondary Perichondritis With Eruptive Fevers.—
1. Scarlet fever. In certain cases there is such virulence of infection that supraglottic and subglottic edema is produced and ulcerations which increase in depth and which may attack the cartilage, from which perichondritis may go on to supuration.

2. Laryngotyphoid. In these cases the arytenoids, the aryepiglottic folds, the epiglottis and the subglottic region are swollen in a mass, and the ulceration, at first superficial, increases in depth and attacks the subjacent cartilage, which becomes necrosed. Ordinarily the cricoid is affected, first by the necrosis, then the arytenoids, and finally the thyroid cartilage and the epiglottis. The external palpation of the vocal organ shows ordinarily the presence of a thickening of the larynx with changes in the fibrocartilage. These types of perichondritis are recognized easily by their evolution, by clinical examination, and especially by the history of the infection.

(e) Secondary Traumatic Perichondritis.—It is difficult to confuse a primary perichondritis with a secondary form when there is a traumatism. In the course of war this complication is almost invariable when the cartilage has been injured. Whenever the thyroid has been struck by a projectile it presents infiltrated, tumefied, thick patches, which are extremely painful on palpation.

In acute cases the patient has severe spontaneous pains in his neck, which pressure increases; the attitude of the patient will be peculiar; head is fixed in a median position and half bent in order to relax the muscles of the cervical region and to immobilize as much as possible the laryngotracheal passage. This latter is swollen; on palpation all the projections of the laryngotracheal tube are absent. The hand feels something like a shield, like a fixed mass in front of the thyroid cartilage and of the cricoid, extending back and on all sides. On laryngoscopic examination the arytenoids are found swollen and the larynx is edematous.

The general signs are marked: the temperature ranges between 38° C. and 40° C.; the pulse is rapid, the appearance tired and the general condition very poor. This clinical picture resembles that of primary perichondritis, but secondary traumatic perichondritis is a less serious affection, the diagnosis of which is simple. In fact, the history of the projectile, the orifice of entrance and exit of which is known; it is only several days after the injury that the patient complains of cervical pain and presents at the level of the thyroid cartilage the characteristic mass. In addition to these, the accompanying general phenomena should demonstrate the presence of a laryngotracheal perichondritis of traumatic origin.

Positive Diagnosis.—Acute primary perichondritis will be recognized by the fact that there is a cartilaginous lesion alone and well defined in the circumscribed forms. The diffuse and serious form must not be confused with other lesions; the ensemble of the general condition is very important.

Treatment.—1. Circumscribed perichondritis. The treatment should consist, if the patient is seen at the beginning of the infection, in an application of belladonna ointment to the cervical region, in moist dressings, and finally in laryngeal sprays. If in spite of this resolving treatment the perichon-

dritis continues to evolve, and there is a formation of a purulent collection, incision is necessary. Early incision has the advantage of circumscribing the perichondritis, in some measure, to the part first affected, and may prevent the formation of a sequestrum which can result in a chronic fistular passage. The incision should be large and sufficient to allow the complete curetting of the infected cavity. The part of the diseased cartilage should be sought for and recognized so that it can be disinfected carefully. A good drainage should be left.

Simple types of perichondritis are ordinarily cured in a few days without leaving any trace of their occurrence, contrary to the secondary types with eruptive fevers, for example.

2. Diffuse Perichondritis.—The diagnosis must be made immediately; delay is fatal.

The local treatment is the same as in the circumscribed form. General treatment should be instituted quickly, because there is a general intoxication of the organism. The following may be found of use: Injection of colloid melats and of camphor water, according to Murphy's method (drop by drop per rectum) with glucosed serum.

These artificial means of defense to conquer a very serious infection should give some un hoped for cures. Unfortunately, generally all means are ineffectual, and the patient succumbs. Tracheotomy itself, which seems theoretically indicated in these serious cases, becomes useless because the lesion involves the entire laryngotracheal lumen, and because the patients succumb to the progress of the general infection rather than to the local respiratory difficulty.

V.—MISCELLANEOUS.

Malignant Neoplasm of the Thyroid With Metastases in the Intestine and in Bone.

BINNIE, J. F.

Surg., Gynec. and Obstet., Chicago, 1918—XXVI—288.

The chief points in the history of this male patient, age fifty-three years, are years of constipation and indigestion. Thirty years ago he had a penile sore diagnosed as luetic and was treated for three or four months without any further luetic symptoms. The patient had personal knowledge that

his larynx had been deviated to the right for twenty years, and recently he had noticed a small hard lump in the region of the thyroid. The patient was suddenly attacked with an acute intestinal obstruction, for which, under gas ether anesthesia, abdominal section was performed and an intrainestinal neoplasm found. Lateral anastomosis was made between points above and below the diseased segment, which was excised, its length measuring about fifteen inches. Uneventful recovery followed. About five and a half months later the gradual increase of the size of the tumor of the thyroid caused dysphagia and a persistent hacking cough but no pain. The tumor was hard, not adherent to the skin, moved with the larynx in deglutation, extending from opposite the upper hyoid cornu to about one finger breath above the clavicle and was about two inches wide.

On the outer and posterior surface of the upper end of the right humerus was a tumor about twice the size of a hen's egg, situated beneath the insertion of the deltoid. The tumor was smooth, rounded, elastic, tender, and had developed during the past five months. The X-ray showed that the tumor has eroded about two-thirds of the thickness of the humerus to which it was attached. The patient had been treated with mercury and sodium cacodylate because of the luetic history, had gained about seventeen pounds, of which he has recently lost six pounds, and was less troubled with cough and dysphagia. One Wassermann test was said to be positive and another was negative. A belated report on the intestinal tumors consisting of multiple polypi stated they were malignant and were composed of thyroid tissue or at least of tissue belonging to the endocrine system.

The tumor was excised from the shoulder, proving to be a soft spindle celled sarcoma. A few weeks later the left lobe of the thyroid was excised, and was reported pathologically as identical in structure with the intestinal polypi removed six months previously. The question arose as to which was the primary growth. The author is inclined to believe that the primary disease was located in the thyroid, while the bone and intestinal neoplasms were metastatic. He closes with a comparison of the reported cases in the literature with his own.

Jos. D. Heitger.

**The Value of Dichloramin-T Chlorcosane Solution (Dakin-Dunham)
in the Treatment of Infections of the Upper Air Passages.**

DELAVAN, D. BRYSON.

Med. Rec., N. Y., 1918—XCIV—89.

In the upper air passages the dichloramin-T may be used with advantage under three different conditions: (1) To prevent the development of newly acquired infection; (2) to overcome the acute results of infection; and (3) to abolish the bacilli persisting in carriers.

Thus, it has been found effective in the prevention of cerebrospinal meningitis and of measles through its early application in subjects who have been exposed to those diseases, and in other analogous situations it has proved a valuable safeguard.

In the case of the tonsil it is the crypts which harbor the most persistent of the offending organisms. It is absolutely essential therefore that these crypts should be disinfected to their lowest depths. In the nose the complicated structure of the superior half of the nasal cavity necessitates that it receive special attention.

First, cleanse the mucous surface within reach with some simple alkalin spray. Follow this with a spray of adrenalin, the adrenalin spray to be repeated until the upper parts have been successively opened and the whole way to the roof of the nasal cavity is clear. Then, and not until then, and guided by a clear demonstration of the parts by a good light and a nasal speculum, the dichloramin-T spray can be thrown to the remote parts which most stand in need of it, and the disinfection of the region made complete. While it may be said that this method, thorough as it is for the nose, does not reach the nasal sinuses, it nevertheless has proved more practically effective than any other method of which we know.

The disinfection of the vault of the pharynx may be secured by first applying the adrenalin to the soft palate and the lateral walls of the pharynx, thus facilitating the complete introduction of the spray.

In cases where no obstruction exists, or where for any reason the immediate removal of adenoid enlargements is not advisable, the dichloramin-T chlorcosane solution seems to

offer the best hope of a speedy cure. If, as is the fact, complete disinfection can be accomplished in uncomplicated cases with as few as three, two, or even one treatment, the superiority of the method over others is beyond question.

The writer concludes:

1. The recognition of the principle upon which success absolutely depends, namely, that in order to carry the dichloramin-T chlorcosane solution to the chief foci of infection these foci must first be thoroughly exposed, as described above.

2. The application of the dichloramin-T solution by means of a properly constructed spray atomizer, the air current being supplied if possible from an air condenser and not by means of an India rubber handball.

3. The devotion of time and painstaking care to the effective carrying out of the treatment.

Emil Mayer.

Some Cases of Facial Deformity Treated in the Department of Plastic Surgery at the Cambridge Hospital, Aldershot.

GILLIES, H. D.

J. Laryngol., etc., Lond., 1917—XXXII—274.

Three cases of war injuries of the face are presented, illustrated by photographs before and after plastic repair had been carried out. The results show how well a serious deformity can be corrected and a pleasing result produced.

The operative procedures are illustrated by diagrams.

Case 1.—Formation of the upper half of the bridge of the nose. The loss of tissue comprised: (1) The nasal bones, underlying portion of septum, frontal spine and upper portions of the nasal process of superior maxilla, the skin and the right eye. First operation: Excision of scar. Submucous resection of a portion of the perpendicular plate of the ethmoid, which was swung forward to form a bridge, and sutured below to septum of lower nose. Two sliding lateral flaps from the cheeks were sutured over this bridge. Result: Flaps healed, bridge gradually sank. Second operation, four months later: Small skin incision; skin undermined from below upwards. When frontal bone was reached periosteum raised, and a piece of rib cartilage inserted. Fitting of artificial eye completed a good cosmetic result.

Case 2.—Temporal muscle transplantation for deformities caused by loss of malar bone: A free graft of fat or cartilage is liable to become infected. Celluloid plates are found unsatisfactory. Temporal muscle flaps in a good many cases have had uniformly good results. U-shaped incision in hairy scalp exposes temporal muscle; anterior third or two-thirds of muscle is elevated from bone, passed under bridge of skin and sutured to deep tissues below the eye.

Case 3.—Describes how a destructive injury of the mouth and cheeks can be repaired: in this case so successfully that the man was able to return to duty. A. J. Brady.

**Extraction of Foreign Bodies From the Upper Part of the
Prevertebral Region.**

PATEL AND ARCELIN, *Rev. de chir.*, Paris, 1917—LII—640.

The writers refer only to the first three cervical vertebræ, the region bounded anteriorly by the posterior wall of the pharynx, and externally corresponding to the maxillopharyngeal space. It is divisible into two regions, the prevertebral proper, limited by the prevertebral aponeurosis and the posterior subglandular space of Sebileau. The latter is characterized by the presence of large vessels, and contains in its center the styloid apophysis. In the former are no vessels, and it is entered by the retrosternomastoid route. The latter is entered by an anterior sternomastoid cervical incision, preceded by tamponing of the lateral sinus.

Most projectiles enter through the nasal root. Those which enter through the neck probably wound the large vessels and cause immediate death. Their locations are: (a) In the prevertebral muscles behind the aponeurosis; (b) astride the aponeurosis, especially if due to shrapnel; (c) in the body of a vertebra, projecting into the prevertebral space, and (d) in the anterior arc of the atlas and occiput.

The first symptoms are those of the lesion of the neighboring structures, especially hemorrhages. When they have passed away, we find difficulty of rotation, fixation and inclination of the head, and dysphagia.

In making radiograms, two poses must be taken, one frontal and one profile. The location of the foreign bodies is made as follows:

(a) Those of the prevertebral region in the frontal picture are at a little distance (up to three centimeters) from the median line, at the level of the upper maxilla or in the angle of the two maxillæ, at the level of the first three cervical vertebræ. In the profile view they lie behind the prevertebral aponeurosis or astride it.

(b) Those of the vascular or styloid region lie further away from the median line, near the styloid process. In the profile view they are generally somewhat higher. They may appear behind the aponeurosis, but this is an illusion.

(c) Those of the pterygomaxillary region have a characteristic radiogram. Like the preceding, they lie far outside of the median line near the styloid, but in the profile view they appear in the middle of the ascending ramus of the inferior maxilla.

The routes for operating are the following: The pharyngeal, the anterior sternomastoid cervical, and the posterior sternomastoid cervical. The last is the one of choice, as it directly enters the region, pushing forward the vasculonervous plexus.

Six cases are described, all operated by this route, with removal of the projectile and cure.

Survey of Head Surgery, Office of Surgeon General, U. S. A., Washington, 1918—I—62.

Gauze Mask in the Prophylaxis of Contagious Diseases.

BERNARD, A.

Progrès méd., Paris, 1918—XXIII—175.

The ordinary method of wearing a gown while treating cases of contagious disease is insufficient to protect those coming into contact with them. The germs present on the nasal and oral mucous membranes are breathed, coughed or sneezed into the air, and attack the physician, etc. This danger is somewhat obviated by placing the patient in boxes with elevated sides. A better way is to surround the patient with mosquito netting suspended over the bed like a curtain, which is sprinkled a couple of times daily with a weak solution of eucalyptol, etc. This has been used successfully in military service by Medical Inspector General Lemoine. Weaver ad-

vised the wearing of a gauze mask to protect the physicians and nurses, as well as to prevent them from becoming carriers of the infection. It covers the face from the chin to the nose, being tied back of the head. From June, 1916, to December, 1917, not one of seventy-three nurses in the scarlet fever wards were infected, although in three previous years there had been nine cases. He concludes: (1) The mask notably diminishes contagion; (2) this is due to the fact that it prevents the infection of the nasal mucous membranes of the attendants.

Surgery of the Hypophysis.

NOVAES, JULIO.

Brasil méd., Rio de Jan., 1917—431.

The writer analyzes the monograph of Prof. Segura of Buenos Ayres, showing grave defects in diagnosis and technic.
J. Szymanski.

Treatment of Whooping Cough.

FONSECA, CESAR.

Brasil méd., Rio de Jan., 1917—380.

The author reported eighty-three cases, treated with inhalations of ozone, which destroys the action of the bacillus of Bordet-Gengou.

J. Szymanski.

The Toxic Element in Goiter.

PERN, SYDNEY.

Med. J. Australia, Sydney, April 6, 1918.

Pern says that in thyroid hypertrophies certain toxins are present, and such hypertrophy can be reasonably looked upon as a defensive process or an attempt to eliminate or destroy such toxins. The type of goiter with hypothyroidism occurring in Gippsland, Victoria, is due to absence of lime salts in the soil. Pern selects thirty-five cases from his case books in which the treatment of pyorrhea, sinus suppuration and the removal of septic tonsils was followed by the cure of Graves' disease.
A. J. Brady.

**The Treatment of Tumor of the Hypophysis, Especially
Acromegalia.**

DE CASTRO, ALOYSIO.

Brasil méd., Rio de Jan., 1917—415.

At a session of Academia Nacional de Medicina, the author calls attention to the surgical treatment of acromegalia in Brazil. He showed the superiority of the intranasal operation.

J. Szymanski.

Tumors of Hypophysis.

LEAL, JUNIOR.

Brasil méd., Rio de Jan., 1917—437.

The author claims that tumors of the hypophysis were not operated in Brazil until now, because almost no such patients are sent to the specialist.

J. Szymanski.

SOCIETY PROCEEDINGS.

THE NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOTOLOGY.

Meeting of May 10, 1918.

Paper: Two Cases of Sinus Thrombosis Which Presented Unusual Difficulties in Diagnosis.*

E. ROSS FAULKNER, M. D.

DR. PERKINS asked what was the condition of the mastoid in the second case.

DR. FAULKNER said that it was just a sclerosed mastoid with no pus. The patient had had a chronic otitis media since childhood.

DR. PERKINS asked what was the condition of the mastoid in the second case.

DR. FAULKNER replied that it was just a stenosed mastoid. The patient had had a mastoid condition since childhood.

DR. PERKINS said that the fact that the patient had such intense frontal pain suggested a possible explanation. The point about the double rise in temperature was well worthy of consideration, but the terrific frontal pain with a process of that nature could only be accounted for by considering that the mastoid being sclerosed the inflammation extended to the petrous portion and disturbed the Gasserian ganglion. This trigeminal neuralgia is one of the symptoms that occurs in involvement of the petrous portion, at this associated with abducens paralysis. It seemed probable that the pus found its way toward the apex of the petrous portion rather than externally, on account of the hard mastoid. While we do not feel like operating upon such mastoids, they are among the most dangerous types of mastoid involvement. We have to deal with pus which cannot find its way externally, and the process goes on and involves the sinus or meninges, or perhaps the labyrinth. When we are asked to do a mastoid and find a hard bone, we are apt to feel disappointed, but we

*See page 970.

should not, as the result often justifies interference as in this case of Dr. Faulkner's.

DR. BRAUN said that the cases were interesting as demonstrating the fact that one cannot depend altogether upon the blood culture in the diagnosis of sinus thrombosis. It is one of the most valuable aids we have, but it is not infallible. A negative blood culture is not of much value, but a positive culture gives much help. He said further that he had never seen a case of sinus thrombosis caused by the streptococcus viridans, and he did not think it was the causative organism in this instance, for Dr. Faulkner had found streptococcus hemolyticus in the pus from the region of the bulb. With streptococcus viridans in the blood and a valvular murmur, one can make a fairly certain diagnosis of septic endocarditis. The only way this particular case could be explained was that either no streptococci got into the circulation from the clot or else they were overpowered by the concomitant infection with streptococcus viridans.

DR. J. G. CALLISON disagreed with Dr. Braun's position in regard to the value of the blood culture. There is sometimes a failure to properly interpret the findings of a blood culture in cases of sinus thrombosis. It is not a diagnostic procedure, but having made a diagnosis it is an important aid in prognosis. There are three stages or phases in sinus thrombosis: First, the forming of the blood clot, during which bacteria are swept off the surface of the clot by the blood current. Second, such a case will become negative later, when the vein is completely occluded and there is no flow of blood through it. Third, when the clot begins to break down and the pus is swept into the circulation, positive blood culture will result. In early sinus thrombosis a positive blood culture is indicative of the fact that the clot is not completely formed. Under these conditions the blood will sterilize itself, if the source of infection is removed. In the later case of a positive blood culture the bacteria are scattered through the blood stream continuously, the bactericidal substances in the blood are absorbed and the blood cannot sterilize itself. Then the prognosis is very bad.

DR. FAULKNER said that he agreed with the position held by Dr. Braun. He had suggested to Dr. Dwyer that the

culture may have been contaminated, but he refused to consider that possible. On the other hand, the patient's condition cleared up so rapidly after the sinus was opened that it seemed rather hard to account for the streptococcus viridans having been the cause of his symptoms.

The pain in the second case was a problem. The latter had been discussed with Dr. Richards, who said that he had sometimes noticed that putting in an applicator in the region of the bulb seemed to produce pain in the frontal region. There might have been a bony inflammation there and pain referred along the superficial petrosal nerve to the orbit. It did not seem very probable that it could be due to a fifth nerve reflex, although that was possible. It was so distinctly localized that it seemed like the pain from a frontal sinus affection.

**Carcinoma of Auricle; Radium Treatment for Eighteen Months
With Failure to Cure; Removed with Half of Auricle;
Plastic Operation to Cover Defect.**

TRUMAN LAURENCE SAUNDERS, M. D., AND

JAMES G. CALLISON, M. D.

DISCUSSION.

DR. GEORGE S. DIXON said that the notes on the radium treatment were incomplete, as part of the record had been lost; but the growth was absolutely healed repeatedly, and the surface as smooth as it could possibly be; but in a very short time—say within three weeks—it would break down again. While in one sense it was cured, in another the radium treatment was a failure, for healing is not a cure, if the condition recurs. While radium is useful in this form of growth, there must be a sufficient amount of substructure. Here there was nothing but cartilage. Quite a number of small epitheliomas have been cured with radium and have not recurred, though they are a rather difficult proposition always.

**Report of Case of Labyrinthomeningitis with High Spinal Fluid Cell
Count Following Radical Mastoid Operation.**

DR. ALFRED KAHN said that he would make only a brief statement regarding this case, especially referring to the

spinal fluid count. He intends reporting the case more in detail in the fall. He was mentioning it now at the request of Dr. Perkins, because Dr. Perkins would refer to the case in the paper of the evening which was at the end of the program. He wished merely to state that the spinal cell count was extremely high. He did not remember the exact count. The count had been reported to him verbally at the time. The case was one of labyrinthine disease following a radical mastoid operation. Two or three days after the operation the patient developed labyrinthine symptoms (nystagmus toward the opposite side, dizziness, etc.). Then the labyrinth became dead and he developed meningitis. The labyrinth operation was not performed, and the patient recovered. Dr. Kahn said that he had hoped to present the patient at the meeting, but had not been able to get in touch with him.

As to the indications for doing the labyrinth operation, Dr. Kahn was of the opinion (regardless of the views of the Vienna school) that our knowledge of labyrinth disease conditions was so limited that no hard and fast rules could govern any case. Being face to face with a meningitis condition, such as we are now considering, we might in one instance perform the labyrinth operation, while on the other hand, in another consideration presenting very similar facts we might not feel justified in operating. In his opinion, with our present knowledge and experience, it does not yet seem possible that one can say firmly, definitely, when a case should be operated or not. The percentage of deaths, even considering those who are presumed to have the best labyrinth technic, is so high there is hardly a chance of recovery. Certainly he himself would not consent for a moment, having in mind our present knowledge, knowing the best operators and the character of the operation, under the most extreme condition, to undergo the labyrinth operation. This would be difficult, for example, of the mastoid operation, so you can judge as to his opinion in the matter. When one comes face to face with such a labyrinth meningitis condition such as we are considering, in his opinion it is rather a toss-up in most instances as to whether the operation should be performed or not. Certainly in the case which he is here reporting, it was thought that the patient would die with or

without the operation. The labyrinth operation was not performed. The patient made a complete recovery.

DR. BLACKWELL asked if there were organisms in the spinal fluid.

DR. KAHN said there were none.

DR. PERKINS said that Dr. Kahn's case, to which he had alluded in his paper, was somewhat of a surprise to him, as he had always held that leucocytosis of the spinal fluid during a labyrinthitis was an indication of a meningitis of a probably fatal nature, which nothing but prompt operation and drainage could save. He had treated several patients of that nature successfully, and had managed to save some, and had felt that he was to be congratulated on the result. Dr. Perkins said that he had not seen this patient, as it was a private case, but had heard of it; that the patient had labyrinthitis, was totally deaf, with nystagmus to the opposite side and vertigo, and that he had a leucocytosis of the spinal fluid of between 600 and 700, and he had supposed of course that the patient would die, but he did not.

Paper: Leucocytosis of the Spinal Fluid in the Diagnosis of Otitic Meningitis.*

CHARLES E. PERKINS, M. D.

DISCUSSION.

DR. KAHN said that a most important question is when is the proper time to do the labyrinth operation. Ought it to be done before meningitis develops, following the radical operation, followed in turn by labyrinthitis, followed by a dead labyrinth? If we operate before meningitis develops we run the chance of opening the subdural space and causing meningitis of an intense type with almost certain death. If we operate after meningitis develops, to follow the rule, we must first have a dead labyrinth. We may even have a high spinal cell count without a dead labyrinth. Following the rule, we should first wait until the labyrinth is dead before proceeding. It must be absolutely dead.

The statistics on the subject are very narrow. They have

*See page 974.

been gathered almost entirely by the Vienna school, based on operations which they, and they alone, have done. They are not based on all the recoveries. Look at the cases in the clinics with discharging ears over a long period of time associated with complete deafness. They are doubtless cases of labyrinth involvement which have not been treated and still have recovered. The statistics in regard to these cases have not been generally kept. The whole knowledge is based on insufficient data. It may be all well enough to discuss this condition and to outline the procedure, but when you come face to face with a case of labyrinth meningitis such as I have reported earlier in the evening, which has been referred to by Dr. Perkins, and your instinct tells you that the patient has an equal chance whether the operation is done or not, you are not in any mood to go ahead and do the labyrinth operation, with the very great chance of opening the subdural space and endangering the case further.

In the case to which Dr. Perkins referred, this point had been weighed carefully, and it was thought the patient would have a better chance if not operated upon, and he did recover. On the other hand, if the operation had been done, and the patient recovered, the credit of the recovery would have been given to the operation. What is one to say? The labyrinth operation is yet in its infancy. The slightest slip by the most skilled operator will result in death. The Richards operation is a tedious one, and the Neumann operation is a dangerous one. One should think carefully before submitting a patient who is apparently dying to such an operation.

Dr. DIXON expressed himself as in entire accord with Dr. Perkins' paper. It is known that the normal cell count of the spinal fluid may be about ten per cubic millimeter. When the cells increase, there is reason for suspicion. He believed the cells to be hemic in origin. When the pleocytosis increases there is added a difference in character and polynuclear cells appear. In inflammatory cases (speaking of meningitis and meningeal irritation), the fluid may become decidedly cloudy and the cells may reach several thousand per cubic millimeter. About the time the cells begin to increase the globulins appear, the glucose reaction decreases and finally disappears, and germs are found either in smear preparations or in cultures;

but even in this stage the patient may recover, provided the infectious germ is not streptococcus capsulatus. Dr. Dixon said that so far as his experience went, all of such cases have invariably been fatal.

He does not believe that one can make a diagnosis of purulent meningitis of otitic origin in its early stage by examination of the spinal fluid alone. One of the clearest cases he had ever known gave no indications of pleocytosis, and the patient died. At the autopsy, a purulent basilar meningitis was revealed; the upper part of the spinal canal was bathed in pus, but there it stopped. The canal was completely walled off, and the pus never got beyond that point. Doubtless the same thing could happen above. There seems to be no reason why a meningitis may not become circumscribed and entirely walled off. When the disease starts it may be simply a plastic exudate, and there is no reason why that exudate should not remain circumscribed, break down in the middle, and then increased cells not appear in the fluid until the wall breaks down and they have a chance to follow a path to the canal. In his experience, in the majority of cases, the increased pleocytosis is the best guide in the early stage, but this must be taken in connection with rise of temperature and a leucocytosis of 18,000 or more. A positive diagnosis of purulent meningitis cannot be safely made from the spinal fluid alone till the culture is positive.

DR. J. G. CALLISON said that the attempt to make a positive diagnosis from the spinal fluid was a recent development in laboratory technic—almost within the last ten years. Before that time the pathologist disliked to see a spinal fluid specimen come into the laboratory, there was so little that could be done to aid in arriving at a correct diagnosis. The fact was noted whether the fluid was clear or cloudy, a culture was made, a stained smear of the sediment was examined and sometimes the tubercle bacilli were looked for. Later an attempt was made to arrive at a diagnosis of meningitis by the presence or absence of copper reduction. About the same time, or a little earlier, the Wassermann reaction on spinal fluid came into general use, and with it the test for the increased globulin content of the fluid. As late as 1910 there was no satisfactory method of making an accurate total cell

count of the spinal fluid, but since then several methods have been devised.

The colloidal gold test, now coming into general use, offers probably the most accurate and certainly a rapid method of making a diagnosis from the spinal fluid. As is well known, there are four type curves in the colloidal gold reaction, depending on the condition present. Of course, the most common of these type curves is that of normal or unchanged spinal fluid, in which there are no changes in any of the tubes of the test. I may say that the set up of a spinal fluid colloidal gold test consists of eleven tubes. In the first the spinal fluid is diluted to 1/10, and this dilution is doubled in each succeeding tube to the tenth, in which it is 1/5,120. There is no cerebrospinal fluid in the eleventh tube. Then comes the cerebrospinal syphilis form of curve, in which there is a rapid rise in the color change of the colloidal gold solution, reaching the maximum at the third to the fifth tube. This is succeeded by a rapid fall in the color reaction, reaching the color of the control at the sixth or eighth tube. A third type curve, not so common, is the parietic curve. This type shows complete decolorization of the colloidal gold solution, usually extending as far as the fourth, fifth or sixth tube. From this point on there is a rapid decline of the color change until the color of the control is reached. In the meningitic type there is no change in the colloidal gold test until about the sixth tube. Then there is a rapid rise in the color change of the colloidal gold solution, reaching the maximum just before the end of the set up. This type of reaction is given in all those conditions where there is no marked increase in globulins. This is characteristic of inflammatory spinal fluids. When it is worked out in early spinal meningitic cases—early otitic cases, one might say, for there the majority of meningitic cases occur—it would seem to be a very promising method. It is certainly desirable to make an early accurate diagnosis from the spinal fluid. The colloidal gold reaction can be read with a fair degree of accuracy after it has been set aside for twenty minutes. While the usual time for making the reading is after four hours, the reading can safely be postponed for twenty-four hours.

In regard to the cell count, it seems doubtful whether or

not the differential count is of value. The total count certainly is of value, and it is from this that diagnosis is made in most cases. In syphilis and tuberculosis the total count is usually not over 300 cells per cubic millimeter, but may rarely go to 500. These cells are lymphocytes and endothelial cells. The count in acute inflammatory conditions is anywhere from the normal, less than ten, to many thousand cells per cubic millimeter. These cells are, of course, polymorphonuclear leucocytes. In inflammatory conditions the count is usually so high before the fluid is examined that there is no question of what the condition is. If you get a count of 300 cells per cubic millimeter with any symptoms of acute meningitis, it may positively be considered that an inflammatory reaction is present. A question which the laboratory can never settle from the spinal fluid is whether the condition is of toxic origin or whether there is a direct bacterial invasion. An exact and final prognosis from the spinal fluid is, therefore, impossible, but from the diagnostic standpoint the prospect is very hopeful.

DR. KAHN said that it is very important in all radical cases to have a spinal fluid count made before operation, so that after operation, if there is a change in the count, etc., in any subsequent after operation he is in a position to immediately recognize it. This primary test increases the value of any subsequent test; as in certain chronic diseases, like syphilis, etc., a change may take place in the fluid different from what is usually considered normal.

DR. PERKINS said that he had had this paper in mind for some time, and had hoped to hear from some otologists who had said to him that they never made a total cell count, and he would like to know how they came to their conclusions.

Referring to globulins in the spinal fluid, Dr. Perkins said they had had one patient at St. Luke's, who had a positive globulin test from extradural abscess. In extradural abscess it was found that without any increase in the leucocytes the report on the butyric acid test was positive, it was thus shown that the globulins can escape through without the leucocytes.

The Fehling had proved very unsatisfactory. In the cases that got well it was invariably negative. If the test is positive, it is really negative for our purposes. If sugar is reduced

by Fehling's test, it is negative so far as spinal fluid is concerned. If the sugar is not reduced by the Fehling test, the patients were in a later stage of the disease, and they all died. It is absolutely of no help in the early stages. These early cases have been considered meningeal irritation because bacteria were not found. The Fehling test has reduced the sugar.

About microorganisms in the spinal fluid, Dr. Perkins said he thought that point had been very well covered. The finding of microorganisms is of very little value to the otologist who is trying to save a patient developing meningitis; twenty-four hours is a very long time—too long to wait if operative interference is going to avail. Even in the late stages the best treatment, so far as surgical measures go, is to remove the area of infection. If the inflammation is from a sinus thrombosis at the inner wall or from an extradural abscess, or from the labyrinth, remove that. Catch the process while it is still walled off in the internal meatus.

In regard to the matter of labyrinthectomy, Dr. Perkins said that he had never posed as an authority upon labyrinthectomy and was still seeking light himself. It is a fact, however, that quite a number of purulent labyrinthitis cases pass into a latent stage, and very likely the labyrinth is filled up with new bone or fibrous tissue and the patients get well. The reports of many cases of deafmutes read very like the reports following latent purulent labyrinthitis. If it was known which patients would develop this latency, it would be the height of folly to operate; but the mortality from the labyrinth operation before the meninges are involved should not be so high as it is. The idea of the chisel slipping and doing great damage is not a point to be considered. The surgeon should be able to do the operation, and there should be no accident if he has perfected his technic. The operation should not be a dangerous one to anyone who is willing to spare the time to perfect his technic. The operation is not performed so frequently as it should be; when there has been an acute labyrinthitis that has destroyed every function of the inner ear and there is no reaction to the caloric test, and there is total deafness, and a leucocytosis in the spinal fluid—that surely is waiting long enough. As long as there is a response

to any reaction it may be called a serous labyrinthitis and operation is not indicated. Dr. Perkins said that he appreciates the difficulty of testing the labyrinth when there is a nystagmus to the opposite side.

NEW YORK OTOLOGICAL SOCIETY.

Meeting of November, 1917.

Radiographs in Acute and Subacute Mastoiditis.

DR. HARRIS said he wanted to refer to the ever recurring question of the diagnosis, or rather the treatment of acute mastoiditis. It was a question they were always discussing, and he had recently read a paper by Dr. Dench on the indications for it. The speaker said he had seen recently two or more cases, where the old textbook definitions were entirely lacking. He did not think that in this gathering any of them would fall down on these cases, but there was still a pretty widespread idea that the classical symptoms must be present, namely, the pain referred to the mastoid, usually subjective, pain at least, if not subjective obtained by pressure, and sagging of the superior posterior wall.

Dr. Harris said the reason of this discussion was especially in reference to what experience the members of the society had had in the use of X-ray pictures. His first case was a man who had gone three weeks with an acute ear and who had had repeated paracenteses (he thought this had been performed three times). There was no pain, no sagging of the superior posterior wall, no symptoms whatever, except a continued suppuration, which was not excessive. The man was very decidedly deaf in one ear, however. The X-ray picture showed almost complete obliteration of the mastoid cells and the operation confirmed everything the picture had shown.

The second case had lasted almost the same time, possibly a few days longer. The day before Dr. Harris saw the man he had a little pain, but up to that time no pain whatever. Neither of the cases had had a blood count examination, and the second case had no preliminary examination until the discharge in the ear. The second case showed the same complete destruction, the same involvement, all that with pus and granulations the first case had.

Dr. Harris said that ten or fifteen years ago he would have been rather puzzled with these cases in making a decision

to operate. He should have felt certain that he would not have been warranted in doing so without consultation. He said he was interested in whether any of the gentlemen were making use, in a routine way, of X-ray pictures, whether they were having a roentgenogram of every one of their cases or only in cases where they were in doubt, as in the cases he had narrated, and how much value the pictures were giving them today.

Dr. Harris said his cases showed absolutely nothing at all. The ear would not stop discharging, or stopped and then went on. The one man had been seen by one of the best New York men, who did the paracenteses. The second man had had no blood examination, neither any temperature, but he was operated on the same day.

DR. KERRISON, in discussing these cases, said he would like to know if anyone present considered an X-ray picture necessary in every case. In the clinics, for example, this would be an immensely expensive procedure, and surely in a majority of cases the diagnosis may be made upon clinical symptoms alone. Purely as a matter of interest and not bearing on the question under discussion, it might be interesting to mention a case which came under his care. This patient, a woman, came to the hospital clinic about a year ago, with an acute middle ear suppuration. Within two days of the onset symptoms of diffuse suppurative labyrinthitis were present. She was admitted to the ward for observation and treatment, which consisted chiefly in keeping her as quiet as possible in bed, with, of course, the necessary cleansing of the ear. Dr. Kerrison was called away from the city some five days after her admission, and was surprised on his return to learn that the patient had insisted on leaving the hospital. This, of course, indicates that the symptoms of vestibular irritation had very largely subsided. When she next appeared at the hospital clinic there was no nystagmus, but the ear was still discharging and the patient was absolutely deaf in the involved ear. She was now sent to the hospital laboratory for an X-ray picture which gave a perfectly definite indication of involvement of all the mastoid cells on the diseased side. The patient, however, refused to return to the ward. Very shortly after this she went to Baltimore, where she came under treatment at the

Johns Hopkins clinic, where a very exhaustive study was made of her case. When later she returned to New York the drum membrane appeared absolutely normal, she had no pain, she was apparently in good health, able to attend to work of some importance, the only remaining symptom being absolute unilateral deafness.

DR. DENCH said he would like to ask Dr. Kerrison about this woman's labyrinth. He asked how this woman's temperature was running, if it ever reached 100 or 102 degrees, and whether she had had any nystagmus.

DR. KERRISON said the woman's temperature never went over 102 degrees. The main symptoms had been nystagmus and absolute deafness, of course with the usual phenomena of disturbed equilibrium.

DR. HARRIS said they had all come to a clear conception of what we would do on the third, fourth, or fifth day, with the clear cut mastoid symptoms, pain, sagging of the wall and discharge, but he asked what rule we were going to make in regard to our cases, which did not heal, as far as the discharge was concerned, at the end of the second or third week, and yet were without pain and the discharge not profuse. Were we accepting the position that a good many men had laid down, that if one did not get drainage through the auditory canal one must get drainage behind the ear. He asked was that simply a textbook statement or were we coming to that position without discussion.

DR. PHILLIPS said they should not permit the fact that there are atypical cases of mastoiditis to disturb their well founded convictions regarding the classical symptoms of the typical cases. We know just what to do for the typical cases, but the atypical cases require good judgment. To Dr. Phillips' mind that was where the radiograph gave stronger help than it did in the typical cases. No man should say that he did not consider a radiograph a very great help, but at the same time he did not think it necessary to have a radiograph made in every case. The radiograph should hold the position of confirmatory evidence. It was a very valuable adjunct and one they should certainly rely upon for purposes of verifying the diagnosis, and especially in these atypical cases. There were several reasons. It tended to tell one how extensive the

disease was, whether one had a large or small mastoid, the location and anatomic outlines of the lateral sinus, and further, the X-ray had an additional value in that it portrayed the pathologic changes in a most convincing manner.

A further point Dr. Phillips said, which Dr. Harris had brought out, led him to make a suggestion based upon very careful observation in a large number of cases with persistent discharge, in the second, third or fourth weeks, the pus continuously pouring out, there was nothing to do but operate. Dr. Harris had said his patient had had no temperatures. Dr. Phillips had been told this by patients and family physician time after time, but after he had put such patients in the hospital he had found some temperature. He regarded this as one of the most significant symptoms in delayed cases. It was his custom wherever an otorrhea persisted into the third week, with even a slight daily rise in temperature, even if it did not show the typical signs, and might not have tenderness or drooping of the posterior canal, to seriously consider operating. If these cases were verified by a radiograph, one had then very valuable evidence.

DR. LUTZ said, as Dr. Phillips had stated, that he had seen several such cases. He believed they got a faulty history very frequently from the family physician who sent these patients, assuring them that the patient never had any temperature. Dr. Lutz had put such cases under observation and regularly found a temperature. He said it might not be more than $99\frac{1}{2}$ or even 100 degrees.

He thought the X-ray was a valuable help in cases of this kind, because the temperature alone was not the cardinal symptom. The clinical picture may convince the otologist that an operation is needed, but he has to be fortified at times by outside means in the position he has taken.

DR. HARRIS asked Dr. Lutz if he thought the X-ray was of any value, except for moral effect.

DR. LUTZ said the value of the X-ray depended a great deal upon who took the picture. He had seen plates that did not tell him a definite thing, and other plates that really astonished him, in which he did not believe the disease so extensive as the plate showed.

DR. KERRISON suggested that the concensus of opinion could be very well stated by saying that the X-ray is useful in doubtful cases.

DR. LUTZ said he did not believe it necessary to take a picture in every case, because they saw so many cases where they had not the faintest suspicion of doubt but that the patient should be operated. He said if one had a doubtful case and a doubting family or consultant, a picture by a man who knew how to take one would be a great deal of value.

DR. DENCH said he was very glad to be asked to speak on this subject, in which he was very much interested, and he had considerable experience in reading them at St. Luke's Hospital. They had X-rays taken of every case where there was the least doubt in an ear that was not going to clear up; moreover, in a great many cases, especially occurring before the war, and they had often made them in every case of acute otitis media. Examination and comparison of a large number of X-ray plates, and plates taken at different intervals of the same patient, where they were not able to interpret what in a doubtful case the picture meant. In any case of acute otitis media after forty-eight hours they would find that the walls were indistinct. If they had an X-ray of that case going on to recovery, taken a week later, they would find that the plate would coincide with the clinical symptoms. Where one had infiltration that part of the plate would become white, then the walls would become more distinct, until one got just a little whitening close to the antrum, and then the whitening existed for a considerable length of time. They had other cases where the mastoid were better opened, and in a certain number these cases healed spontaneously and healed by sclerosis. In a certain number of cases, which Dr. Dench had reported, he had a series of plates taken, and after the first plates they were frequently operative on the eighth or ninth day, and in the absence of any symptoms it would have been foolish to operate, because of the plate before that time. Sometimes on the twelfth or fifteen day, the patient would still be doing well, and it looked better at the end of two weeks, and then the whole thing would stay cloudy and that might be sclerosis. The value of a series of X-ray plates is that it would help one to read plates accurately.

With reference to the remarks of Dr. Kerrison's case, of which he would like to hear the report, it struck Dr. Dench that he had seen the same condition in perilabyrinthitis in a man where they could not wait for the perilabyrinthitis to clear up. The man was absolutely deaf, except for loud sounds, and now he heard as well as he did prior to the attack. He showed exactly the same symptoms as Dr. Kerrison's case.

Dr. Dench said that roughly a picture would be most valuable about the fifteenth day. He operated on a nurse, in which the X-ray did not show anything, but he operated. Another point was, not only who made the X-ray, but who read the X-ray. He had seen X-rays which other men said were excellent, but he did not see anything in them. He got accustomed to reading plates by a certain man, and thought this man's plates better than any other man's, just because he got accustomed to reading them. Dr. Dench thought the whole point depended on the plate being read by the man who was accustomed to read these particular plates made by one radiographer. He thought they would learn a great deal more by simply following these cases up and have X-rays made in various stages than if simply confined to uncertain cases. A patient had come to Dr. Dench six weeks previously with an obscure history, in which he could not tell whether it was a furunculosis or acute otitis media. There were two or three little warty spots in the canal, and the drum membrane looked dull. The case history showed that the patient several years ago had a so-called mastoiditis and had just escaped operation and was taken care of by a very excellent man. Dr. Dench took the patient down to a certain radiographer and they both looked at the plate, and this man said it was not an operative case, and subsequently it cleared perfectly. He saw the case twelve days after inception of the acute condition, with a history of so-called mastoiditis several years before.

To show how very valuable this was, when the work was a great deal younger, seven or eight years ago, this certain radiographer enabled Dr. Dench to pick out little areas of softening and he found them absolutely so located at operation. For that reason he believed the X-ray was of the greatest possible advantage and would enable them to clear up doubtful cases. Whether he would operate on the X-ray

alone, he could not say. He said he had never seen any cases that did not show in addition to the X-ray some symptoms, some haziness of the drum membrane, some temperature or narrowing of the canal. He did not think $99\frac{1}{2}$ degrees a temperature, and if all the men had temperatures taken they might go over 99 at some time during the twenty-four hours.

DR. PHILLIPS said they were doing an enormous amount of X-ray work at the Manhattan Eye, Ear and Throat Hospital, and it was a daily occurrence, though probably not so frequent at the present time, because of the expense.

DR. DENCH said that he thought the use of the X-ray picture, simply to impress upon the family physician the necessity for operation, was wrong and savored of quackery. Many of these men would not have even the slightest conception of the meaning of the plate.

DR. LUTZ thought the plate made a lot of difference in convincing the patient that he needed a mastoid operation. The patient frequently appreciated the opinion of his family physician very much more than a man he has seen only two or three times. The picture would show what the patient could not be made to understand by talking with him. Dr. Lutz found that it was sometimes harder to convince the family physician that an operation was needed than it was to satisfy the patient. For all these purposes a plate was a help where everything else failed.

DR. HARRIS said he raised this question not because he had any concern that the gentlemen differed in their views, but because of the fact that a man who is doing a great deal of operating and is connected with two hospitals seemed to think that the use of the X-ray was a very rare and unusual thing. Dr. Harris said the gentlemen present had stated his views very decidedly. The X-ray was to him invaluable, of the greatest help in doubtful cases, and while he never would forget that they must emphasize the clinical findings, yet to have the apparent disregard that a good many men were still showing to such a valuable help in diagnosis surprised him, and he wanted this society to go on record that they were getting benefits in these doubtful cases. It was of course understood that these pictures must be good pictures. He thought those in our special hospitals were good pictures. He should be

very sorry indeed to see the X-ray taken away for the help in these doubtful cases, and he felt that what had been said should receive publicity at some time or other.

Mastoiditis With Staphylococcus in Pure Culture.

DR. PHILLIPS said he would like to emphasize a point made in connection with some cases that he had reported last winter, where the infecting organism in a number of mastoid cases was staphylococcus in pure culture. He had not the figures of the cases of mastoiditis in private and hospital practice, but a considerable proportion of these cases showed the infecting organism to be the staphylococcus. He had a series of these cases and reported two before the society, and he said the chairman had then stated that cases of that kind had not come under his notice. Dr. Phillips inquired whether such cases had turned up since at other institutions. Dr. Dwyer had gone very carefully into a study of these cases with him and the cultures had been made in all cases.

DR. DENCH said he could not answer for any such cases, and he had gone into the matter very carefully. He had reports of staphylococcus coming back to him, and they always turned out streptococcus or pneumococcus. He had had only one such true case, and had forgotten whether it was albus or aureus. He also had such cases at St. Luke's Hospital, with a report of staphylococcus, and when he sent them back to the laboratory again they changed into something else.

DR. PHILLIPS said they ran their cases through pure culture in every case, and he would bring this matter out with Dr. Dwyer. Dr. Duel had also had such a case, which was fatal.

Discharging Ear and Dizziness Complicated With Syphilis.

DR. LUTZ said he wanted to mention a case he had seen some time in June, a patient from the Brooklyn Eye and Ear Hospital, having pain in his ear and complaining mostly about dizziness. When Dr. Lutz saw him he urged him to stay in the hospital. He came in that night, went out the next day and then came back to the clinic. He was more dizzy and his mastoid pain was worse. The ear was discharging profusely. Dr. Lutz did not see him the second time, but the assistant surgeon in the clinic urged the patient to come back to the

hospital and be operated on, but he got away. They did not know anything about him for nearly three weeks. Dr. Lutz was then asked to go to the Bushwick Hospital to see a man who had been operated upon, and it proved to be this patient, but he was still dizzy. After he had been taken into the Bushwick Hospital he showed a four plus Wassermann reaction, but they did not get the record until after the operation. Dr. Lutz wondered if that dizziness might not have been due to syphilis. They did not do any further operation, but the patient got perfectly well after being put on antisyphilitic treatment. When he first appeared in the clinic he seemed to have an acute labyrinthine involvement from his mastoid involvement.

DR. PHILLIPS said it was very fair to assume that so far as the labyrinth condition was concerned, it was due to syphilis.

DR. LUTZ said he wondered in one of the cases Dr. Kerrison had, whether that case had been specific and his hearing had improved after treatment. He said he thought it was probable that where the hearing had gone and afterward returned this was a possibility.

Examination of Army Aviators.

DR. KERRISON related the interesting findings in the case of an applicant for the army aviation corps, who came before him for examination. This was a young American, twenty-two years of age, who had always enjoyed excellent health. He had also been something of an athlete as a short distance runner. Dr. Kerrison's examination was solely in regard to his static labyrinth. After the prescribed method he was rotated ten times in twenty seconds—first to the right and then to the left. There was absolutely no nystagmus after rotation in either direction. He was then rotated ten times in ten seconds—first in one direction and then in another, following which the man pointed with absolute accuracy—that is to say, he showed no past pointing—and there was still no nystagmus. To carry this test still further the man was again rotated ten times in ten seconds and directed immediately to stand with eyes closed in the Rhomberg position. This position he was able to maintain without any difficulty. According to army regulations this man would be rejected for the service, yet one

would think that he might prove a particularly fit subject for aviation work.

DR. DENCH asked if this man who was examined for the aviation corps had ever had cerebrospinal meningitis.

DR. KERRISON said, in answer to Dr. Dench, that this man had never had cerebrospinal meningitis. He had never suffered any disturbance of equilibrium which led him to think that his static mechanism was in any way at fault.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of March 19, 1918.

THE PRESIDENT, DR. FRANK ALLPORT, IN THE CHAIR.

PRESENTATION OF CASES.

DR. JOSEPH C. BECK exhibited a number of patients showing the results of plastic operations about the head and neck.

A New Tuning Fork Nomenclature.

A. H. ANDREWS, M. D.

C1	C2	C3	C4	C5	C6	C7	C8	C9
16	32	64	128	256	512	1024	2048	4496
D1	D2	D3	D4	D5	D6	D7	D8	D9
18	36	72	144	288	576	1152	2304	4608
E1	E2	E3	E4	E5	E6	E7	E8	E9
20	40	80	160	320	640	1280	2560	5120
F1	F2	F3	F4	F5	F6	F7	F8	F9
21	42	85	170	341	682	1365	2710	5421
G1	G2	G3	G4	G5	G6	G7	G8	G9
24	48	96	192	384	768	1536	3072	6144
A1	A2	A3	A4	A5	A6	A7	A8	A9
27	53	106	213	426	853	1706	3412	6826
B1	B2	B3	B4	B5	B6	B7	B8	B9
30	60	120	240	480	960	1920	3840	7680

The present plan of designating tuning forks for otologic work is unsystematic and confusing. It uses algebraic terms without algebraic significance. In the development of the plan it began in the middle and worked both ways. Otologists have long recognized the desirability of a better plan, but the origin of the present plan and the traditions surrounding it have seemed to prevent the serious consideration of any change. The present time seems propitious for American otologists to do things to suit themselves.

The new system suggested is to begin with the lowest C fork and designate the first octave with the number "1" following the letter. Each successive octave is designated by the number following each letter in the octave. While this is not offered as the best possible system, it has the advantage of simplicity and clearness.

DR. JOSEPH C. BECK spoke on the subject of

Plastic Operations About the Head and Neck.

and showed a series of lantern slides demonstrating many of the operations which he had performed.

He said the purpose of this talk was in line with what we might be called upon to do as the result of our entrance into the great struggle, the work of plastic surgery of major form. Not that which is required so frequently in otology and laryngology, but in the destruction of the greater part of the face, the external ear or nose, and other parts about the head and neck. The work has already been well established for men who have been at the front where they have been exposed to missiles. There would be plenty of work for everybody to do in this line, and it was for that reason that he wished to present the subject. It was not to show any brilliant results, for a corrected deformity was anything but beautiful, but the patient who sustained an injury to the external nose or ear was most gratified when it was corrected, even though not perfect. He had yet to see a single patient whom he had operated for external deformity of any magnitude that had attempted to sue for damages. They were invariably proud of their condition and very grateful. There was scarcely ever a patient but what came from the poorer class of people. They were mostly charity patients with no means of pay for the work that was required, and it took a great deal of work on the part of both the patient and the doctor to get anything like the desired results.

The pictures were those of a number of operations which were being followed and showed the operations which he was teaching the men in the service who would go out to do this work. He was very proud of the results obtained by some of the men who had already gone over and were doing the work he had taught them in courses in St. Louis and Chicago.

LEGENDS OF ILLUSTRATIONS.

Slide 1.—Partial destruction of the nose, corrected with Wolfe graft, septal mucoperichondrium and cartilage reconstruction. (Eight illustrations.)

Slide 2.—Subtotal loss of the nose (eight illustrations). Corrected by transplantation of little finger.

Slide 3.—Loss of ala, corrected by pedicle cheek flap (three illustrations). Collapsed ala stiffened by cartilage transplant (two illustrations). Bony costal cartilage transplant (two illustrations).

Slide 4.—Italian plastic from arm to nose and finger support (four illustrations). Hindoo method, from forehead to nose (four illustrations).

Slide 5.—Temporary and permanent resection of the upper jaw (seven illustrations).

Slide 6.—Loss of upper jaw, including the lower eyelid and skin of the face, reconstructed by tunnel flap (three illustrations). Loss of right upper and lower lip and part of chin, reconstructed by double flap (two illustrations). Combining the tibia bone graft (two illustrations).

Slide 7.—Compound comminuted fracture of the lower jaw (eight illustrations), showing the involvement of the fragments; interposition of bone transplant; suturing the draining; wiring the teeth and emobilization of the jaw.

Slide 8.—Partial and total loss of external ear, showing tunnel flap and temple flap reconstruction of auricle (eight illustrations).

Slide 9.—Tracheotomy and laryngectomy (four illustrations).

Slide 10.—Laryngostomy (eight illustrations).

Slide 11.—Laryngoesophageal plastic with cartilage transplant (two illustrations). Laryngectomy (five illustrations).

Slide 12.—Complete loss of cartilaginous portion of the nose (two illustrations). Partial loss of ala, skin and cartilage (two illustrations). Partial loss of ala and skin, including part of the cheek (one illustration). Marked fistula with loss of cartilage substance of ala (one illustration). Complete loss of cartilage of nose, including columella (one illustration).

Slide 13.—Complete loss of bone and cartilage as well as dermal portion of external nose (two slides, sixteen illustrations).

Slide 14.—Complete loss of cartilaginous portion of the nose with marked cicatrization, involving the upper lip, corrected by artificial nose (four illustrations). Complete loss of bony and cartilaginous portion of the nose. Skin preserved (one illustration). Complete loss of cartilaginous portion of nose and marked retraction (two illustrations). Extreme saddle nose (one illustration).

Slide 15.—Complete loss of columella and destruction of cartilage following paraffin injection (four illustrations). Congenital luetic destruction of the entire external nose in otherwise healthy family (one illustration). Kink saddle nose (one illustration). Plan saddle nose (one illustration). Destruction of columella and ala, cicatrization (one illustration).

Slide 16.—Destruction from burn, both alæ, both external ears, both lips, both cheeks and neck, with marked ectropia and retraction, especially of lower lip (eight illustrations). Including the operation by Italian method, also showing plaster cast.

Slide 17.—Loss of columella, cicatricial contraction, Roberts' operation, phalanx transplantation, reformation of nostrils (eight illustrations).

Slide 18.—Fracture of external nose with cartilaginous transplantation (four illustrations). Tubercular destruction of columella (two illustrations). Destruction of ala by electricity, corrected by Italian double transplantation method (two illustrations).

Slide 19.—Fracture of cartilage and bony portion of nose, corrected by fat transplant (four illustrations).

Slide 20.—Traumatic saddle nose, corrected by rib transplant (four illustrations). Saddle nose from hematoma of septum, corrected by fascia lata transplant (four illustrations).

Slide 21.—Traumatic saddle nose, rib transplant with infection (three illustrations). Baseball saddle nose, rib transplant (three illustrations).

Slide 22.—Kink saddle nose, corrected by costal cartilage transplant (five illustrations). Congenital absence of septal cartilage, corrected by costal cartilage transplant, including external support (three illustrations).

Slide 23.—Mild saddle nose, tibial graft transplant. Saddle nose following hematoma opened externally. Corrected by costal cartilage transplant from mother to child (four illustrations).

Slide 24.—Traumatic saddle nose, corrected by costal cartilage transplant. Held in position by nasal saddle fixation (four illustrations).

Slide 25.—Mild saddle nose, corrected by paraffin injection in the year 1898 (six illustrations).

Slide 26.—Hump nose, corrected by intranasal method (four illustrations)—two illustrations of external method and two of combined external and intranasal method).

Slide 27.—Traumatic saddle nose and fracture of the lower margins of the orbits with fistula, corrected by costal cartilage and facial plastic (four illustrations). Compound fracture of the nasal bones, supramaxillary and lacrimal, with tearing of the muscles by means of traction pulley. Corrected by plastic of the muscles and fixation of the fragments, tendon resection of tear duct, and fat transplant (three illustrations).

Slide 28.—Carcinoma of the external nose, destroyed by Percy cautery, and plastic reconstruction from facial flaps (four illustrations). Rhinophyma (two illustrations). Rhinophyma decorticated (one illustration). Epithelioma of the external nose (one illustration).

Slide 29.—External frontal sinus wall destruction with fistula (one illustration). Same condition corrected with fat transplant in the sinus (one illustration). Author's osteoplastic flap frontal sinus operation (one illustration). Multiple operation on frontal sinus with marked deformity (one illustration). Cerebral hernia, corrected from father to son, fascia lata (one illustration). Cerebral hernia uncorrected (one illustration). Cerebral hernia fascia lata transplant (one illustration).

Slide 30.—A dentigerous cyst resected and osteoplastic flap of alveolar process obliterating it (three illustrations). Oral antral fistula corrected with alveolar plastic (one illustration). Resection

of the upper jaw for carcinoma, twelve years ago, corrected by prothesis.

Slide 31.—External double hare-lip and cleft palate, corrected by Lane-Ferguson method (four illustrations). Adult cleft palate, corrected by author's trap-door plastic and inferior turbinated obdurator transplant (two illustrations). Luetic adhesion of soft palate and posterior wall of pharynx kept apart by transplant of posterior pillar and tonsil (one illustration). Ala deformity from hare-lip and cleft palate partially closed by inferior turbinated transplant (eight illustrations).

Slide 32.—Laryngotracheal fistula, laryngostomy, closed by author's trap-door plastic (two illustrations). Laryngotracheal fistula, laryngostomy, five attempts at closure (three illustrations, one illustration showing hand and toe union with toe transplant to larynx.) Unsuccessful. Skin and clavicular transplant, successful. Laryngotracheal fissure and laryngostomy closed by author's trap-door method. Growth of hair within the trachea from transplant. This removed under suspension.

Slide 33.—Prolapsed esophagus following chondromalacia post-diphtheritic. Laryngostomy, specially devised tube to prevent contraction of esophagus into the larynx (three illustrations). Laryngostomy with subhyoid fissure after artificial larynx implantation (two illustrations). Author's hard nasal clamp (one illustration). Max Joseph's orthopedic retainer (one illustration). Author's wire mask in a case of septal perforation, closed by middle turbinate autoplatic. (Transplant from one patient to another.) Mask used to prevent nose being touched.

Slide 34.—Facial paralysis, central origin (one illustration). Facial paralysis, congenital. Facial paralysis from extreme traction on the cheek in antrum operation. Congenital facial paralysis corrected by author's wire ceton method. Facial paralysis following application of trichloracetic acid to eustachian tube. Facial paralysis following removal of polyp in ear. Facial paralysis secondary to radical mastoid operation in which the entire tip of the mastoid was removed.

Slide 35.—Facial hypoglossal anastomosis with tongue retaining function two weeks after operation (two illustrations). Facial hypoglossal anastomosis with herpes along the course of the facial nerve (two illustrations). Facial paralysis traumatic. Following pitchfork thrust into external canal, grazing facial nerve canal in mastoid. Simple mastoid operation, recovery (two illustrations). Facial paralysis, dead labyrinth. Radical mastoid, including the exenteration, recovery (two illustrations).

Slide 36.—Severe trauma of face, scalping with fracture of nasal bones and superior maxillae in woman aged 62 years. Immediate repair (two illustrations). Traumatic absence of external ear (two illustrations). Faulty union after operation for ankylosis of lower jaw (one illustration). Ankylosis of lower jaw relieved by masseter implantation between two fragments of the ramus. Author's method. Resection of large neuroma in the parotid region, closed. Cavity filled up by fat and closed by sliding flap (two illustrations).

Slide 37.—Large retroauricular cavity closed by Author's trap door and sliding osteo-periosteal skin double pedicle flap (two

illustrations). Retroauricular post operative mastoid fistula communicating with external auditory canal. Closed the same way (two illustrations). Retroauricular postoperative mastoid fistula communicating with external auditory canal (two illustrations).

Slide 38.—Giant ear (two illustrations). Congenital lop ears (two illustrations). Same condition with partial facial palsy in two brothers (one illustration). Practically total congenital absence of external ear, three cases (one illustration).

Slide 39.—Post traumatic destruction of the greater portion of the external ear with scar on the face and side of scalp. Corrected by flap transplant from scalp, including the hair. The hair removed by electrolysis (five illustrations).

Slide 40.—Tubercular destruction of the external ear, including canal, thoroughly destroyed and artificial ear supplied (three illustrations).

Slide 41.—Lymph angioma treated with radium, 75 mgrs. pure. This without marked benefit. Removed tumor and anchored part of the masseter in the upper lip (seven illustrations).

Slide 42.—Malignant hemorrhagic angioma treated at five different areas. Eyelid, radium 15 mgrs. pure. Boiling water injected into the cheek. Freezing with carbon dioxide (snow) into the region of the forehead and temple. X-ray and diathermia to upper and lower lips. Parotid region subcutaneous ligation, with complete destruction of the angioma (four illustrations).

DISCUSSION.

DR. FRANK ALLPORT asked how Dr. Beck felt in regard to the average curability of facial paralysis.

DR. J. HOLINGER asked whether in radical mastoid operations with the large opening behind the ear, Dr. Beck would under all circumstances advise closing? He had operated quite a large number of cases in that way, before the more modern ways were known—i. e., before 1902 or 1903, and had never heard any complaint from the patients. Furthermore, there was sometimes a niche in the bone immediately behind the entrance of the external canal, which could not be controlled from the external canal, where large masses of epithelioma and secretions might gather later on and cause trouble. He now had a patient in whom he closed the opening behind the ear at the operation and he wished he had not. The cells extended far upward and backward, leaving now a deep epidermized pocket which causes trouble regularly twice a year. He would not condemn the perpetual opening behind the ear under all circumstances.

DR. CARL WAGNER stated that he had attended the meeting instigated by the feeling that he would learn a great deal from

Dr. Beck, whom he had watched develop from a boy. He felt that several things of great interest came out in the paper. It had been his privilege to watch the greatest plastic surgeon of his time, Dr. Nicholas Senn, for fifteen years, and was positive that during that time they saw hundreds and hundreds of the most wonderful achievements in plastic surgery for his time, but tonight they had seen brilliancy which he had never expected to see in his time in the presentation of Dr. Beck's patients and slides. He hoped they would go out through the United States and the whole world in behalf of those who were suffering. He was positive that if Professor Senn were living he would be glad to pay homage to Dr. Beck.

Dr. BECK, closing, thanked Dr. Wagner for his complimentary remarks and said that in a paper presented before the Chicago Odontological Society he had spoken of Dr. Senn as his teacher in this work. It was his privilege to dress some of Dr. Senn's cases, and he learned a great deal in that way. He was proud to say that he once received a slap from Prof. Senn for making a mistake in dressing a case. Prof. Senn was always teaching the principles of plastic surgery and would untie a stitch two or three times in order to get it just right, so there was no tension. In his papers he brought out the points of how plastic surgery should be done.

Replying to Dr. Allport's question as to how many cases of facial paralysis were cured by anastomosis, Dr. Beck stated that he had operated fifteen cases. Of these three had made perfect recoveries, four of the other cases were all right when in a position of repose, but when they laughed they pulled the skin of the face to the side. The rest of the cases were absolute failures, which he attributed to the fact that he operated upon them without taking into consideration the reaction of degeneration. They were early cases that were operated when he wished to do the operation and learn how to perfect it and the cases were not properly selected.

He thought Dr. Holinger's question was not well taken. He was sure the majority of the men would not wish to go back to the foul smelling open operation. The X-ray revealed the condition before the operation, and Dr. Shambaugh had shown splendid cases two years ago, showing the dis-

tribution of cells. With a good plastic operation which exposed the parts thoroughly there was nothing to fear. In the cases he had shown they simply brought the two layers of the skin together, and there was nothing that had to do with the mastoid process. They were cases which were absolutely healed. If there was a large opening left behind it was due to faulty technic or that the skin was bad.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL
SOCIETY.

Meeting of April 16, 1918.

THE PRESIDENT, DR. FRANK ALLPORT, IN THE CHAIR.

Paper: Benign Neoplasm of the Nasal Septum.*

G. W. MOSHER, M. D.

DISCUSSION.

DR. ANDREWS did not think the growths were very common, as was indicated by the author of the paper. He remembered but one in his practice and that was a papilloma, which grew from the upper part of the septum well forward. He removed it once and it recurred, and after removing it a second time it did not recur again. Two years had passed since the last removal.

DR. GEORGE E. SHAMBAUGH stated that he has had under observation for several years a case of benign tumor in the nose, which springs from the ala of the nose at about the region of the limen nasi, which is the junction between the skin and the mucous membrane. The tumor was a papilloma, with rather a broad base. He had dissected out a large part of it at different times, but it had always recurred. There was nothing malignant in the growth, however.

DR. GOOD had a physican who presented a papilloma of the septum with a wide base. The tumor itself was about three-fourths of an inch up and down and one-half inch anteroposterior. He did a resection of the tumor, removed the cartilage under it and it did not recur. It was on the anterior inferior portion of the septum on the left side.

DR. MOSHER, closing, presented a slide which he thought probably some of the pathologists could throw some light on. He was inclined to take the word of the pathologist at

*See page 981.

the hospital. He considered it an adenoma. He made a section of the body of the tumor itself, but further than that he did not have a chance to talk with him about it. He just took his word that that was what it was. He was rather surprised to have heard the other men say that had seen papillomas but not adenomas, so he was very glad to have had the privilege of presenting the case.

The Effects of High Explosives on the Ear.

J. GORDON WILSON, M. D.

To the otologist an outstanding feature in the present war is the number of cases of deafness, either total or partial, occurring without any demonstrable trauma capable of accounting for the deafness and due to the bursting of the high explosive shells. The force of the explosion of these shells is enormous: it may pitch a man several yards away or blow him out of the trench. The deafness is usually a combination of conduction deafness and nerve deafness, but the relative part played by the middle ear and the nerve mechanism varies considerably. Dr. Wilson has fully entered into this subject in previous papers. It need only be said that the worst cases of deafness he had seen had been associated with no drum rupture and very little apparent damage to the middle ear. In early cases the otologist often has no difficulty in diagnosing a trauma. However, the rupture of the drum or the congestion of, or the effusion into the middle ear may have been so slight that evidence of these may have entirely disappeared by the time the man gets to the base hospital.

In previous wars concussion deafness was rare. Gruber, who was otologist at the War Hospital in Vienna during the Austro-Prussian war, saw only one case. In the Franco-Prussian war, in the Prussian army, only twelve cases were recorded. In the Russo-Japanese war only 101 cases were recorded in the Japanese army.

The outstanding result of the concussion is the nerve deafness. The following hypotheses have been advanced to account for the deafness: (1) That there are pathologic changes in the organ of Corti and the ganglion cells; (2) that hemor-

rhages have occurred in the internal ear; (3) that there is an interruption in the central auditory path, due to small hemorrhages; (4) that there is a temporary interruption in the auditory path from functional disturbances not due to organic lesions. At first Dr. Wilson was inclined to lay too much importance on the fourth hypothesis, but from specimens he had examined, some of which were shown, he was inclined to think that though a number may be due to a functional derangement, there certainly were cases in which the deafness is due to an organic lesion.

The first series of the slides which he showed illustrated the results of laboratory experiments by Wittmaack, Yoshii and Hoessli on guinea pigs exposed to explosives. These bring the laboratory work into line with the results obtained in man. The laboratory results showed:

1. Rupture of the tympanic membrane and hemorrhage into the middle ear.
2. Pathologic changes in the organ of Corti amounting even to complete destruction.
3. Little or no change in the vestibular mechanism.

The second series of slides obtained from a man who died from severe abdominal wounds forty-eight hours after injury from shell burst, showed:

1. Intact and undamaged footplate of the stapes.
2. Hemorrhage into the internal auditory meatus and the modiolus.
3. Changes in the organ of Corti—pillars and tunnel intact; edema and small cell infiltration into the basilar membrane and between the hair cells.
4. Displacement of the tectorial membrane and its adhesion to Reissner's membrane by serous effusion.
5. Little or no change in the vestibular mechanism.

The third series of slides showed:

1. Variation in the fields of vision associated with shell concussion deafness.
2. Devices to protect the ear from shell explosives.

A very important problem to be solved is how to protect the ear against the concussion. The use of cotton does not satisfactorily block the concussion; clay impregnated with fiber cuts out all sounds and prevents the hearing of orders. The

Armstrong device, which was shown, avoids both of these difficulties to a large degree, but is difficult to wear.

The device by Professor Michelson and the doctor, which also was shown, appeared to the members to answer all requirements. Laboratory experiments with pistol shots showed that it protects animals perfectly and, what is of importance, acts more effectively the higher the explosive force.

DISCUSSION.

DR. SHAMBAUGH said certain facts had long been recognized in regard to the relation between injuries of the internal ear resulting from explosions and injury of the drum membrane. Where the drum membrane had been ruptured the injury to the internal ear is usually less; or in other words, the cases where the internal ear had been most severely injured had been cases where the drum membrane had remained intact.

In regard to the actual injury which is sustained in the labyrinth of the ear as the result of explosions, the facts in regard to these injuries have only rather recently been ascertained. Examinations made of human material have not as yet thrown any light upon this interesting problem, for a reason which anyone who had worked histologically with the internal ear understood. It was not possible to secure in human material that fixation which is necessary to prevent the development of artefacts which resemble so closely the changes produced in the organ of Corti by explosions. In order to get the proper fixation it is necessary to inject fixing fluid into the circulation either before or immediately after the death of the individual. This work can only be done with animals. In the specimens exhibited it was impossible to say whether all of the changes were due to faulty fixation or not.

If a pistol was shot or exploded close to the ear of a guinea pig and then the labyrinth immediately removed, with proper fixation one can always recognize certain definite distortions in the cells which make up the organ of Corti. If after this experiment the guinea pig is killed, say after a month or two, one or two things present themselves: Either the organ of Corti has undergone a degenerative process in which the

specialized epithelium has become flattened, or a complete regeneration of the distortions caused by the explosion has taken place. These facts have been definitely worked out and explain exactly what is met with clinically. In cases where the ear has been injured by an explosion, not infrequently the deafness remains permanent. In other words, the organ of Corti undergoes degeneration. In some of the cases, perhaps where the injury had not been so severe, a regeneration of the organ of Corti takes place and there is a gradual return of the hearing function. Dr. Shambaugh remembered very distinctly when Dr. Wilson first returned and expressed the view that the injury to the hearing was the result of intracranial lesions, so he called his attention to the work which had been carried on by Siebermann and expressed the view that he did not see any reason for assuming an intracranial lesion as the cause for the defect in hearing, when it was perfectly well known what took place in the labyrinth itself. It seemed that Dr. Wilson also took this point of view later on.

He was very much interested in one of the observations which Dr. Wilson had made, namely, that in these cases of concussion with deafness there was also some vertigo, and yet from the examination of histologic preparations no injury could be detected in the end organs of the vestibular nerve—that is, in either the macula acustica or the crista acustica. He also asked Dr. Wilson whether he had had an opportunity of observing any of these cases while they were still having this so-called vertigo, and whether he had observed any of the characteristics of vestibular vertigo, and especially whether there was any spontaneous nystagmus. Patients have often said that they had vertigo, but when it came time to question them more closely, it was found that they were not really suffering from vertigo at all, but were using the term vertigo rather loosely to express other indefinite sensations.

DR. HOLINGER said that a series of experiments on birds was made at Professor Liebermann's laboratory in Basle in the winter of 1913-14, and they were published in December, 1917, by Benno Schwabe in Basle. The experiments treated the questions of Dr. Wilson's paper. It demonstrated the birds have no cochlea, instead a straightened out part called lagena, but the birds have a basilar membrane and an organ

of Corti, which differs in several respects from those of the mammals. It was, however, impossible for Dr. Holinger to go into details. The results of the experiments were of the greatest interest, and practically solved a number of questions which were in the foreground of our interest in the physiology of hearing, as well as in the destruction caused by over-irritated organs of hearing by explosions close to the ear.

The second point was the great controversy between Wittmaack and Liebermann as to the primary location of the destruction. Wittmaack said the ganglion cells and the nerve elements were destroyed first—the destruction of the end organ is secondary. Dr. Wilson drew attention to the ganglion cells. Liebermann opposed that view and said that the injury to the ganglion cells and nerves was secondary, and that the primary injury was found in the organ of Corti. In other words, there is an ascending degeneration of the nerve apparatus and not a descending degeneration. That Liebermann was right was conclusively shown in these experiments. To study the whole question in the original communication was highly instructive, and on account of the clear and unequivocal diction a veritable pleasure.

DR. ANDREWS said it was very interesting to note the position of the tectorial membrane in the cases of injury in the specimens which Dr. Wilson had shown. Following injury it was well up against Reissner's membrane, and in Dr. Wilson's specimens it was apparently attached to it. The position of the tectorial membrane may have had something to do with the permanency of the impairment of hearing. It was possible that its becoming attached to Reissner's membrane may have had something to do with the permanency. Of course this was only a suggestion.

DR. LEWY asked Dr. Wilson if it was possible to tell in the human subject whether the injury was due to a sudden change in atmospheric pressure, or whether it might have been due to the head being knocked against the ground.

He also wanted to know whether they had tried the simple device used by the aviators as a means of protection of the ear. They simply use a piece of adhesive plaster over the earpiece of the helmet, punctured with numerous pinholes. They said that gave them relief from the discomfort of the

rush of cold air. If this proved successful, it would do away with the necessity of wearing something in the external auditory meatus.

DR. WILSON, closing, said the question had been asked how can one account for the vertigo, often of long duration. He believed that the changes in the internal auditory meatus and the small hemorrhages so often seen in the course of the vestibular path were the basis for the vertigo. In regard to the relation of the displacement of the tectorial membrane to the deafness one may speculate, as Dr. Andrews had said, in regard to what would happen if the serous effusion which apparently fixes it to Reissner's membrane were absorbed. A more interesting question was why is that tectorial membrane so displaced. An answer to this would give some idea of the mechanism involved in the perception of sound.

In regard to perforated plates, he did not think they had been used. Dry cotton, which is perforated, is used very much, but is not satisfactory.

ABSTRACT OF THE PROCEEDINGS OF THE FORTIETH ANNUAL CONGRESS OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION.

Held at Atlantic City, New Jersey, May 27-29, 1918.

By EMIL MAYER, M. D., NEW YORK, ABSTRACT EDITOR.

The president, Dr. Thomas H. Halsted, Syracuse, New York, called attention to the fact of this fortieth anniversary comprising practically the whole period of modern laryngology.

He paid a tribute to the memory of Dr. E. Fletcher Ingals, a founder of the association, who died but a few days before the meeting, and who remained to the last an Active Fellow, furnishing last year one of the most valuable papers of the meeting.

He welcomed, also, Dr. H. S. Birkett of Montreal, one of the fellows of the association who, responding promptly to his country's call, had spent nearly four years in active service, rising to the highest rank and responsibility.

Each fellow of this association feels a personal pride in these achievements.

Of an active membership of eighty-two, thirty per cent are in the active Naval and Military Service of the United States, which is a very creditable showing, considering the average age of its fellows.

The speaker then presented for the subject of his address:

A Diagnostic Clinic for Pay Patients.

While organization of hospitals for the care of ward cases and dispensaries for free ambulatory cases have been well organized, there has been no combined arrangement for the care of private patients, hence it frequently happens that a diagnosis cannot be made because of the expense involved in calling in as many physicians as the case really demands.

Ofttimes the patient seeks relief by consulting various physicians of his own volition, producing disappointing results.

It sometimes happens that the right physician is accidentally consulted, and the cause of the obscure symptoms found, with a resulting cure.

It is for the profession to devise the means of correcting this

very grave fault. As a result there have arisen many institutions where the medical staff is comprised largely of specialists of different branches. While some of these institutions are excellent in every way, the great majority are not of this character, and as long as they are purely commercial organizations they never will be.

The speaker said that the scheme devised, worked out and practiced for nearly three years by the Clinical Club of St. Luke's Hospital, San Francisco, offered the best foundation from which to build a diagnostic clinic, and that it had met this particular situation.

The medical staff of this hospital consists of twenty-four full staff members, four consultants and ten assistants, with an excellent clinical laboratory and complete X-ray department.

In the hospital to which the speaker is attached, the first choice was given the regular staff, after which the assistants were given an opportunity when vacancies arose. The staff was divided into two groups serving on alternate months, with a third group known as the auxiliary group, made up of those specialists whose services would not be required in every case. The latter become available in any case in which the group chairman thinks such service desirable.

The chairman is responsible for the history of the case, and after his examination is made arranges for the visits of the other members of the group, together with such members of the auxiliary group as he may desire. A supervising nurse keeps the records and attends to the financial end of the work, sees that specimens are furnished the laboratory, arranges the details of the physician's visits, is present at all examinations, typewrites the notes and attends the general consultations, taking the minutes and transcribing them.

After all examinations, clinical and laboratory, have been completed, a general consultation of all who have had to do with the case is held, and every possible diagnosis arrived at, the physician referring the case being present and participating in the consultation.

A satisfactory conclusion having been reached, a report is sent to the referring physician, a second copy to the patient or his responsible relative whenever this seems desirable, and a third retained in the files of the clinic.

Only cases that are obscure and complicated and apparently cannot be diagnosed by the average physician, are accepted by the clinic.

A minimum fee of \$50.00 and graded upward, according to the patient's financial situation, is charged. Such fee includes the services of the medical man and of the laboratory and X-ray departments, as well as of the supervising nurse. In addition, the hospital charges regular room rates for time occupied.

The portion of the fee remaining will be finally divided equally among those who have examined the case, to be received by them individually or be voted by them for the purchase of new equipment for improving the service of the clinic of the hospital, the latter being expected to be the disposition of the funds for some time to come.

In rendering this service they will themselves receive much knowledge and should benefit greatly through these examinations and consultations, adding materially to their diagnostic ability.

The hospital will benefit by the steadily increasing efficiency of its staff.

Finally, the speaker called attention to the work of its committee in the National Council of War Defense, and requested a quick response to the appeal of the Surgeon General for voluntary medical service to meet the demands of the drafted army.

Each man must weigh the matter for himself, and putting aside any argument and all questions of personal advantage, reach a decision that he will be willing to submit to the scrutiny of his fellows and abide by their decision. Those who can go are to be congratulated; they are to be envied; they are the favored ones of the profession. A doctor who in this emergency can conscientiously go and fails to respond to his conscience and his country's call, putting a selfish profit first, is not to be envied but to be pitied.

To commemorate the fortieth anniversary of this society, a historical review of the early days of laryngology was read by the honorary president, Dr. J. Solis Cohen, of Philadelphia, followed by Dr. D. Bryson Delavan of New York.

The scientific program then followed with the papers and discussions here presented.

Report of Some Interesting Cases of Vincent's Angina.

CLEMENT F. THEISEN, M. D.,

ALBANY.

There are two distinct clinical types of the disease, one form to be differentiated from diphtheria and other pseudomembranous anginas occurring almost exclusively in young people, while the other form has a localized ulceration simulating syphilis occurring mainly in adults, usually, in the writer's experience, associated with carious teeth, especially in those whose mouths are not well cared for.

The odor is distinctive and characteristic, and if not promptly treated, extensive ulceration of the fauces occurs with fatal ending.

The writer has had two fatal cases. One previously reported in 1912, and the other a recent case in a man thirty-two years of age. The uvula and part of the soft palate had been practically destroyed, and there was deep ulceration of both tonsillar surfaces and of the gums around the last molars. The ulcerated surfaces were covered with a tenacious pseudomembrane. The molar teeth were badly decayed, and the gums bled easily when touched with a probe. The odor was so bad that it required a good deal of courage to examine him. He said the condition had been going on for several weeks, and he had received no treatment. He had been using a mouth wash of peroxid and water.

He was in an extremely weakened condition, because the pain in swallowing was so severe that he had not been able to take much nourishment. No history of syphilis could be obtained. Smears from throat swabs verified the diagnosis of Vincent's angina.

He was given a strong solution of potassium chlorate, powdered alum, carbolic acid, glycerin and water, to be used as a gargle, and locally the ulcerated surfaces after cleaning were swabbed with a saturated solution of methylene blue in alcohol. He was given K. I. in large doses. This is always administered in the writer's cases, whether a history of syphilis is obtained or not. Blood count showed a moderate leucocytosis. He failed steadily in spite of all efforts, and died

about two weeks after he was first seen. The larynx was not involved in this case.

Salvarsan was used both locally and intravenously without any appreciable effect. No autopsy.

Pure alcohol swabbed on the ulcerated surfaces is also extremely valuable. The greatest difficulty is in having the severe cases get enough nourishment, because the pain in swallowing is often so great. A solution of orthoform in olive oil, swabbed on the ulcerated surfaces before meals, affords a certain amount of relief. A spray of carbolic cocain in the worst cases gives more relief than anything else, if used a few minutes before meals. In some of the adult cases of the ulcerative type we are probably dealing with a combination of syphilis and Vincent's, even when we fail to obtain a history of syphilis. That may be one reason why salvarsan acts so promptly in some cases, although the concensus of opinion would seem to prove that the arsenic preparations do have a specific action. He has known cases of this kind in which there was a positive Wassermann (with no syphilitic history), with the typical clinical and microscopic evidence of Vincent's.

DISCUSSION.

DR. CHRISTIAN R. HOLMES, Cincinnati: I should like to ask as to the temperature of the patients; whether blood cultures were made in the two severe cases, and how he used the alcohol treatment—by applying it locally or not. In Camp Sherman we had quite a run of Vincent's angina in the soldiers; but none of them were seriously ill. All were the kind of cases that yield readily to treatment.

The treatment was nitrate of silver bead applied in the crypts, using it on a heavy silver wire, the patients using gargles of permanganate of potash and peroxid of hydrogen. Gargling with vinegar diluted with equal parts of water was tried lately and appeared very effective.

DR. LEWIS A. COFFIN, New York City: We have had many papers on this subject. From these it is evident that patients have gotten well under various forms of treatment. It strikes me therefore that if these cases are seen early, recovery may be looked for, if any of the various methods be applied vigorously. The speaker referred to a case which he treated

twice daily for about a week, when he told the patient that he was practically well and need not return for forty-eight hours. The same afternoon, after sitting out during a ball game, he was seized by a chill, which was the ushering in symptom of a typical attack of follicular tonsillitis.

COL. HERBERT S. BIRKETT, M. D., Montreal, Canada: Perhaps there is no condition which is more prevalent than Vincent's angina amongst British troops. I seldom saw it in any of the colonial troops, and this I think arises from the fact that the mouth conditions are very well cared for amongst the Canadians. The condition was found not only on the tonsils but also on the gums, even as far forward as the incisor teeth; it would seem as if this was due rather to direct infection. My experience with this condition is that it yielded rapidly to treatment consisting of an application of hydrogen peroxid, liquor arsenicalis and vin ipecac.

DR. EMIL MAYER, New York City: It is relatively easy to make a diagnosis of Vincent's angina when there is an exudate and you can make a smear; but I saw some days ago an instance in which the diagnosis comes to me as a very great surprise. This was in the case of a lady who took good care of her teeth, and was a woman of much refinement. She consulted me on account of a spasmodic cough. She had a skin affection for which she was being treated. I saw a simple mild exudate on her soft palate, which I felt to be an evidence of the skin infection on her mucous membrane. I felt that she had a similar condition on her trachea, because of the negative result of all of the examinations. Her sputum was really more saliva than anything else; and I was intensely surprised at the report that it was full of the fusiform bacilli. There was an absence of anything like a membrane, yet the condition occurred, and in a person not neglectful of her teeth or anything else; so it probably occurs much more frequently than we really have a right to expect in this class of cases.

The treatment that has answered best for me has been the local application of salvarsan, together with the iodine and glycerin, which I recommended at the time the first case was reported by myself in the English literature. I have never seen the severe fatal cases. Arrowsmith reported a case in which the patient nearly died. I think that it behooves us to

be on watch, because we may probably discover cases where we do not dream of them.

DR. GREENFIELD SLUDER, St. Louis: Dr. Theisen spoke of a solution of methylene blue in alcohol alone. I am glad to know that; but I have also used the methylene blue in powder and in aqueous solution, and likewise found it to answer the purpose.

DR. CLEMENT F. THEISEN, Albany, closing: Replying to Dr. Holmes' question regarding blood cultures, I would say that we did not take blood cultures, but we took blood counts; and the leukocytes in both cases were increased. I forgot to mention the increase in the polynuclears, and also to mention a method of treatment—a combination of old drugs which is practically a specific, either as a gargle or in the spray form. This combination consists of potassium chlorate, powdered alum, glycerin and water. It works like a charm. The alcohol is used locally.

**Report of Some Cases, Mostly Traumatic, of Serious Damage to the
Nose and Accessory Sinuses, Operated Upon Externally, With
Excellent Cosmetic Results.**

JOHN R. WINSLOW, M. D.,

BALTIMORE.

The writer reports a number of cases of operative cure after serious injury to the face:

1. Extensive traumatism of the nose, face and frontal sinuses due to a fall from a height. Operative cure with exceptional result.

2. Frontal empyema with extensive bone necrosis and external fistula, operated upon externally in several sittings. Cure of condition with excellent cosmetic result.

Several interesting points were presented by this case:

- (a) Lack of intranasal pathologic conditions. A virulent infection (erysipelas?) seemed to have attacked the frontal sinus and uppermost portion of the bony framework of the nose without involvement of other nasal sinuses.

- (b) The posterior (cerebral) sinus wall was denuded, but was hard and seemed devitalized rather than necrotic. It took a very long time for it to regenerate (twenty-six months),

but his own judgment and the advice of colleagues was that it was better to delay than to assume the risk of removal.

(c) Marked anesthesia of the operative field, the packing being for a long time painless, doubtless due to the devitalized bone.

(d) Excellent cosmetic results.

3. Fracture of the external bony framework of the nose and the nasal septum by the kick of a mule, causing depression of the tip of the nose and great disfiguration. Restoration of appearance and function by operation.

4. Fracture of the right nasal bone and nasal process and a portion of the orbital process, by an iron rod; formation of sequestra and abscess, with secondary infection of the right antrum. Operation and cure, with good cosmetic result. Photographs showing their excellent results were presented.

DISCUSSION.

DR. JOHN E. WINSLOW, Baltimore: I should like to hear from Dr. Coakley or some of the other experts, as to the proper plan of treatment under such conditions as I have described, where there is necrosis of the cerebral wall of the frontal sinus. How long are we justified in waiting for nature to attend to it? Did I wait too long, or was I too conservative?

DR. CORNELIUS COAKLEY, New York City: When I have operated on the frontal sinus I have never found actual necrosis of the wall unless there had been syphilis. It is unusual for me to find such a condition. What I have found is that in cases that have been operated on previously, there has been a temporary cessation of the discharge with fistula formation. When I have opened up the frontal sinus in these cases it has not been infrequent to find areas of very marked softening in the bone, such as one finds in a mastoid operation at the borders, when one has gotten back of where the large cells are and come to the cells just between these and the cancellous bone. I think that there is no reason why that bone should not be regarded as infected bone, just as in the mastoid region; and I feel that neglect to clean out this diseased bone and get down to healthy bone, whether in the anterior wall or anywhere else, is not good surgery. You

should get to good bone, even if you expose the dura in the frontal region.

In one instance I found such a degree of softening of the posterior wall that I felt sure that I should find exposure of the dura and epidural abscess. Fortunately, however, that was not the case. I went through an area of three-eighths of an inch of vascular soft bone before coming to what must have been a very thin area of good bone at the posterior wall of the frontal sinus. The soft bone was all cleared out. A drain was placed in the wound for a short time, leading to the nose. The wound was sewed up, as in the ordinary Killian operation, and the patient has made—temporarily at least—a good recovery. The operation was done three months ago, and up to the present time there has been no recurrence, although there were two or three before that. Soft or diseased bone, or any other bad bone in the frontal sinus, should be treated just as you are in the habit of treating the same kind of bone in the mastoid or any other region.

DR. LEWIS A. COFFIN, New York City: I should be much less afraid of a curette than of leaving diseased bone in a patient. As to whether the posterior wall being necrotic and perforated is an invariable sign of syphilis, I have grave doubts. I have seen this condition in comparatively few cases; one case was in a child of six years having perfectly healthy parents. In reporting that case I spoke of another that I had previously seen in which the anterior wall was so soft that I removed it with a spoon curette and stated that I did not see why the posterior wall should not be affected by the same pathologic process as the anterior wall. A case somewhat similar to the one just reported comes to mind. A young woman was riding in an automobile when the peculiar accident happened. The shaft of a wagon to which a horse was attached entered the antrum through the middle of her cheek, fracturing the floor of the orbit and the anteronasal wall. She had been under treatment for some time when I saw her. Removing a pad of gauze from her face revealed a stream of pus pouring from the open wound in her cheek. I made an incision over the eyebrow down over the ridge of the nose and the center of the skin covering the columnar cartilage and dividing the upper lip in the median line. Turning the flap well back

gave a good exposure of all the diseased parts, which were thoroughly cleared out. We and our patients are fortunate in the kindly way in which incisions of the face heal. In this case there was practically no scarring except where the shaft of the wagon pierced the cheek.

DR. GEORGE L. RICHARDS, Fall River, Mass.: The ability of the face to heal is very remarkable. I recall that some years ago I had a patient who was riding a bicycle down a hill-side when the chain broke, and he was pitched suddenly forward in such a way that he tore off the front of the face from the nose to the chin, and in addition got all the dirt of the street into his wounds. A number of operations were necessary, but in the end a fairly good looking face resulted.

DR. T. PASSMORE BERENS, New York City: It seems to me that this is the same condition that we find in the mastoid of bone that is not syphilitic but is simply an unusually firm hard bone. We have to be patient, and let it heal. A number of years ago I mentioned the mild pressure that was needed in these cases, such as would come from a pince nez with long horns pressing the nasal bones together. It seems to me that if he had exerted a slight constant pressure, such as you get from a pince nez, he would have overcome that broadening of the nose. I merely mention this to accentuate the benefit of constant mild pressure.

DR. BRYSON DELAVAN, New York City: In suppurative conditions of the nasal sinuses if there should be any question of the existence of syphilis, operative work must be undertaken with caution, since under antisyphilitic treatment many cases have been cured or have satisfactorily improved without operative interference. Many cases could be quoted to prove this. It may be said, therefore, that where there is a positive Wassermann reaction wait, if possible, until a course of specific treatment has either cured the sinus disease or made the necessity for operation clear.

DR. JOHN R. WINSLOW, Baltimore, closing: I do not want to leave anyone under the impression that I am ignorant enough to leave soft bone and close it in the wound. It was not soft, but hard as steel, and I curetted it three times as much as I thought was safe. I acted not only on my own best judgment, but also on the advice of several friends.

Carpet Tack in the Right Bronchial Tube of a Patient for Two Years With No Pathologic Symptoms; Exhibition of Plates.

DUNBAR ROY, M. D.,

ATLANTA.

This occurred in a female aged twenty-eight years. X-ray showed the tack in the right bronchus between the seventh and eighth ribs. Its removal was at once attempted by upper bronchoscopy and failed. Tracheotomy was performed the next day, the bronchoscope passed, but he was unable to grasp and dislodge the tack, and the tracheotomy wound allowed to heal.

Five months later a bronchoscope was easily introduced by upper bronchoscopy by Dr. R. C. Lynch. The tube was too short and the foreign body could not be removed.

The patient has been entirely well since then, now two years, increasing in weight. X-ray photographs were shown showing the tack still in situ.

The writer presents records of a number of cases of this character, many of them without producing untoward symptoms.

DISCUSSION.

DR. T. H. HALSTED, Syracuse: In connection with this case of Dr. Roy's, I should like to report the recent removal of a foreign body from the right bronchus occurring in a girl of ten years. This child while playing, having occasion to put her pocket handkerchief to her mouth, inhaled a metal clip, shaped somewhat like a fish hook, which had been in her pocket. There was an immediate attack of dyspnea, lasting a few moments, but within a few minutes no symptoms beyond a sensation as of something sharp lodged in the throat remained. A physician saw her within ten minutes, at which time all symptoms had disappeared, beyond the pricking sensation. He assured her that she must either have expectorated or swallowed it. She had no trouble that night, but the next morning, the sticking sensation referred to the neck continuing, she consulted another physician, Dr. Swift, who had an X-ray made. This disclosed a foreign body in the right bronchus. She was referred to me for operation. Under

general anesthesia I soon located the metallic object by upper bronchoscopy and made repeated but unsuccessful efforts at removal. The X-ray failed to tell whether the sharp point was directed up or down, and it could not be determined by direct inspection. The next morning stereoscopic plates were made, and showed the foreign body to be in the right bronchus, sharp point upward. Under ether, the trachea was opened, and under lower bronchoscopy the foreign body was, after two hours' work, removed. It was in the second division of the bronchus, firmly wedged, but by manipulation it was finally removed by a long alligator forceps with but little damage to the bronchioles. It was a flexible steel clip used in clothing stores for holding cardboard price marks, shaped like a sharply bent fish hook, the shaft being three-fourths of an inch long and the pin portion half an inch. It, together with the stereoscopic plates, are presented for examination. The tracheal wound was at once closed, the child made an uneventful recovery, leaving the hospital in eight days. It was the most difficult case of its kind I have met with.

Concerning Atrophic Rhinitis and Ozena; With Report of Cases Referred To Last Year.

LEWIS A. COFFIN, M. D.,

NEW YORK CITY.

The speaker believes he was the first to suggest that the foul odor which so frequently accompanies atrophic rhinitis and constitutes the disease known as ozena has its origin and is caused by a chronically diseased and poorly drained antrum. Since making this statement others have reported to him that they had treated several cases in this manner with the same excellent results.

In one of his cases there was no improvement whatever, although operations had been performed on both antra.

He was unable to account for the failure in this instance.

DISCUSSION.

DR. CORNELIUS G. COAKLEY: It seems to me that all the odor should not be attributed to disease of the maxillary sinus. If the patient had pansinusitis I do not see why it

should be cured by washing out the maxillary and leaving the same pathologic process in the ethmoid and frontal. Of course you do not get so much odor from them, but I should think you should clear them up as well as the maxillary, and I suggest that as the cause of the continuation of the odor.

DR. GEORGE L. RICHARDS, Fall River: I have had good luck in using the chlorinated oil in the type of case that Dr. Coffin has been speaking of. It is purely empirical. I used it thinking that it would do some good to place it on the surface and hold it there. It was done with the swab or spray, and not after opening the antrum. I have not been converted to the belief that all or even the majority of cases of atrophic rhinitis are due to antrum disease.

DR. THOMAS H. HALSTED, Syracuse: After seeing Dr. Coffin's cases last year, I treated a case with the foulest odor I ever encountered. I did a double antrum (simple Mikulicz) operation on her. The odor was simply unbearable and unendurable. Nothing further was done. The saline douche that she was using was kept up. I did not see her, after she went home, for a year. Then the odor had entirely disappeared. There was no odor from the nose whatever, and no other treatment had been carried out during this time but the washing out. In three of five other cases there was absolutely complete cessation of all odor. It was one of the most satisfactory operations of any that I have done. Of three of my five cases, the odor of which was very bad, was entirely relieved by the antrum operation; in the other two it was greatly lessened. There was a marked diminution in the amount of crusting in the nose. The odor comes, I am satisfied, more from the gas from the antral secretion than from the nasal scabs, though doubtless some comes also from the other sinuses, the frontal, ethmoid and sphenoid, when they are involved, and their treatment, by ventilation through operation, will be required in such cases.

DR. HENRY L. SWAIN, New Haven: What did you find in the maxillary sinus?

DR. THOMAS H. HALSTED, Syracuse: Nothing much; the operation was done by simply opening through the nose. I was not able to see as you would with a Caldwell-Luc. I made

a good big opening through the nose and got ventilation and prevented the retention of secretion and pus.

DR. SWAIN, New Haven: Did the X-ray show anything in the antrum before operating?

DR. HALSTED, Syracuse: There was no X-ray plate made.

DR. SWAIN, New Haven: Did the transilluminator?

DR. HALSTED, Syracuse: Yes, and I did one of these operations recently in a nurse where the transilluminator was clear.

DR. SWAIN, New Haven: You operated in spite of that?

DR. HALSTED, Syracuse: Yes.

DR. GREENFIELD SLUDER, St. Louis: The point that I should like to make is that if Dr. Coffin has established the opening of the antrum for the cure of ozena and the stench of an atrophic rhinitis, it seems to me that it is one of the greatest advances presented to us for a long time. Last year I asked the question, which was not answered, "What happens in a case of atrophic rhinitis when the olfactory fissure is crusted all around?" There is an antrum open, but the atrophic process is as active and destructive there as elsewhere.

DR. HENRY L. SWAIN, New Haven: In speaking to Dr. Sluder's remarks, I was endeavoring to bring out the proposition that Dr. Coffin has brought before us, because he will be accused of saying that he cures atrophic rhinitis by opening the antrum. He does not cure the rhinitis, but does cure the odor, as Dr. Sluder says. As I said at the last meeting, it was a most radical remark on Dr. Coffin's part, and if it bore truth as promised it was really an epoch-making suggestion, and I rise to confirm Dr. Sluder.

DR. GREENFIELD SLUDER, St. Louis: I forgot to state that I am going to try it when I get home.

DR. HANAU W. LOEB, St. Louis: It is obvious that if there is any process of this nature in the antrum, by securing good drainage there will naturally be improvement in the odor, just as I have found that by clearing out the ethmoids a particular odor that may accompany the process will improve or disappear. I feel that Dr. Coffin's contribution in this respect constitutes simply calling attention to the fact that the antrum

being the largest cavity connected with the nose and most intimately associated with its function, the greatest opportunity for the development of these crusts is offered by it whenever it is subjected to the action of the putrefactive bacteria. I do not see why it should be affected in all the cases, or even in more than a fair number of the cases, because, according to my information and observation, the antrum is not more often affected than other sinuses.

DR. HENRY L. SWAIN, New Haven: If the people will take enough pains to cleanse the nose properly most of them can remain inoffensive to their immediate environment. That would not be the case if the odor depended entirely on the condition of the interior of the antrum. So, although I am particularly friendly to Dr. Coffin's suggestion, I am sure that we are not going to cure all cases by opening the antrum, because all cases are not due to that. We are not saying that he does not do it, but we hope to do equally good work. In an antrum where I could see in pretty well through a large natural opening between the antrum and the nose, where there was an atrophic process in the nose, we could see in the antrum that the mucous membrane lining the antrum had the same process going on in it as in the nose. That is, there were masses of atrophic material lining the entire cavity of the antrum. If that could exist once, it could many times, and that explains why in some of these cases in which, as Dr. Halsted discovered, where there is no darkness under transillumination, there will be going on the same process as in the nose, which can be relieved by opening the sinus, and only by doing so.

DR. T. HALSTED, Syracuse: In three of my cases the odor was extreme. In the other two, the odor is much relieved. It is simply remarkable what improvement has taken place. I can only say in a general way that there was a diminution in the amount of crusting. I do not believe that all the odor comes from the crusting. I believe that it will be proved that it is from the maxillary sinus as well as the ethmoid and frontal.

DR. GREENFIELD SLUDER, St. Louis: If the author can locate the antrum as the point from which the stench proceeds,

that is the most valuable contribution that we have had for a long time.

DR. L. A. COFFIN, New York City, closing: Dr. Sluder has given a perfectly proper definition of ozēna as "the odor accompanying atrophic rhinitis." Then he talks of seeing scabs about the olfactory fissure—but does not state that there is any odor or ozena from these particular scabs. We are not discussing scabs but an odor known as ozena.

Dr. Coakley asks why the antrum rather than the other sinuses? The antrum is practically the only sinus I have ever opened from which was emitted a foul odor. This occurs frequently and is due to the anatomic structure of the antrum. Drainage is at the top, while in most other sinuses drainage is from the bottom.

The case of a young lady comes to mind. She had extreme atrophy, no inferior or middle turbinates in sight, nose much bescabbed, and when she first came emitting a foul and stinking odor. Her antra having been opened and cleansed, the odor (ozena) has entirely disappeared, while undoubted disease of many of the other sinuses persists, as does scabbing, although not to the same degree as before the treatment of the antra.

She was one of the cases seen by Dr. Halsted. Another was a young boy about twelve years of age. Apparently he had not only marked disease of the antrum of one side but marked ethmoiditis as well—nose full of crusts and ozena. I opened and treated the antrum, purposely leaving the ethmoids untouched. The odor disappeared.

As to the value of the X-ray in diagnosis: It is a help, by no means infallible. Personally, I care little for another's reading of the negative. Now, these are the thoughts which I wish to impress and leave with you: First, that the odor of ozena comes frequently from disease of the antrum, and is relieved by the treatment of the antrum. Second, please remember that I have today reported a case not so relieved.

I trust that you will all try the treatment, as has Dr. Halsted, and that you will bear in mind that we do not expect 100 per cent perfect in 100 per cent of the cases.

Three Unusual Nasal (Sphenopalatine) Ganglion Cases.

GREENFIELD SLUDER, M. D.,

ST. LOUIS.

The usual neuralgic picture is pain in and about the eyes and the upper jaw, the teeth, extending backward about the temple under the zygoma into the ear, making earache; and then backward into the mastoid; and severest usually at a point two inches back of the mastoid, to extend into the occiput, the neck, the shoulder; into the shoulder blade, and sometimes the axilla and breast, and frequently down into the arm, forearm, hand and even to the finger tips.

Added to this symptom complex, frequently is found a sneezing and watery secretion more marked probably in the morning, frequently extending through the day; a red external nose, with tearing eyes, photophobia, and a sense of discomfort in the eyes difficult for the patient to describe.

Occasionally, however, are added unusual features to this clinical complex. These cases record phenomena that at present are unique and cannot be explained. They may be recorded as facts.

The first case was relieved of the dizziness and the headache after cocainization of the ganglion, the headaches returning in six hours. The patient passed from further observation.

In the second case headache ceased, but as an effect of cocainization the right eyelid drooped very perceptibly to obscure probably half of the blepharospasm, and the pupil contracted to one-half of its fellow of the opposite side.

The third case was one of a right sided blepharospasm of great severity, and was a post-ethmoid sphenoid suppuration with polyps on the right side.

Cocainization of the right nasal ganglion relieved the blepharospasm for a period of three hours, and injection of the same ganglion was followed by relief of the spasm for three to six hours.

Operating on the ethmoids and sphenoids did not relieve the spasm.

The left side was then operated upon without relieving the spasm, although the right eyelid opened after injection of the left ganglion.

DISCUSSION.

DR. EMIL MAYER, New York City: We are much indebted to Dr. Sluder for calling attention to these nasal ganglion cases and what may be done for them. I recall the case of a young woman whom I had successfully treated for dysmenorrhea by intranasal treatment. She came to me later, suffering with headache, and I cocainized the nasal ganglion on the side that she had her headache. An hour afterward she telephoned to say that her headache had completely ceased. She was so rejoiced that she felt that she must let me know at once how much better she was. She remained well for some months and then had a recurrence. She came again and had an application made to the ganglion on that side, and it has remained well ever since. Though I cannot explain why we can get such wonderful results in dysmenorrhea cases by a treatment which must perforce be called empiric, some of us may at some time be able to understand and explain it. The word empiricism must apply in this instance, as in the other instance of Dr. Coffin's, where we are unable to give a true scientific reason for the things that we do. The result is there, and the patient is happy, and that is all that can be said.

DR. HENRY L. SWAIN, New Haven: I have tried to cocainize the ganglion neuralgic cases, and I want to confirm the speaker in what he has observed on the question of dizziness, which I have been unable to explain any more than he has. One of the cases that I cocainized for headache also suffered from vertigo, and it was relieved entirely during the period of her cessation from pain, which was only two or three weeks. I made another application of adrenalin and cocain in combination, and she was relieved for so long that she did not think it necessary to have any further treatment of that kind. That was a year ago. I have not seen her since, and do not know whether she is still well or not.

The question of why we have pain in these sinus cases is most interesting. I have had a number of cases of severe pain with disease which I thought was well and have had an X-ray picture taken to learn the exact state of things. The neuralgia has ceased in five instances immediately after taking the picture, so there must have been something in the exposure

to the X-ray that broke up the nerve complex in some way and caused the pain to stop on the spot. Previously I had been treating the case without seeming relief. Immediately after taking the picture the pain stopped. This occurred in several instances in persons that I saw every day, the pain ceasing thereafter entirely. The question arises, Could this fact be put to some therapeutic use, and be of some therapeutic value? Shall we expose patients with this type of neuralgia to the X-ray to cure them? That question I leave to you to answer, but I do not think that this occurrence was accidental in all five cases in which there was no sinus disease but neuralgia and in which following the X-ray exposure the pain disappeared entirely.

DR. GREENFIELD SLUDER, St. Louis, closing: The case that Dr. Mayer has described was, I fancy, one of those in which the ganglion lies particularly close to the surface. That sometimes happens, and such a case may be exploded into the most violent lower-half headache by an ordinary coryza. Cocainization, in that case, is curative, not palliative merely.

Dr. Swain's observation that an X-ray relieved headache is exceedingly interesting.

Report of Syphilitic Necrosis of the Intermaxillary Portion of the Superior Maxilla.

LIEUT.-COL. CHARLES W. RICHARDSON, M. C.,

WASHINGTON.

The history of a young man, twenty-six years of age, married, stock broker's clerk, is presented. First seen on April 16, 1917, on account of intense pain in the floor and lateral wall of the left nasal chamber. There was no swelling or inflammation, and no interference with the function of the left nasal chamber.

The patient had shortly before been operated on, or stated that he had been operated on for a mild affection of the septum, although there was no evidence of such operation having been done. The patient's condition was attended by great suffering.

After a few days, during which transillumination and X-ray examinations were made of the incisors and lateral bicuspsids,

as well as of the left antrum, all of which were negative, a Wassermann was made which resulted in a double positive.

As there was great tenderness over the upper incisors, patient had four of these removed. Salvarsan was given. In spite of this the intermaxillary bone separated by rapid necrosis in one mass.

The important and salient features of this case are:

1. Severe and continuous pain without any objective signs.
2. The severe necrosis without any inflammatory swelling.
3. The complete limitation of the necrosis within distinct anatomic borders.

DISCUSSION.

DR. HENRY L. SWAIN, New Haven: In a similar case to Dr. Richardson's, where the patient had most severe pain, after proper internal and local treatment, I removed a sequestrum fully as large as that which he has shown us. A fistulous tract led through to the floor of the nose. The entire premaxillary bone came away, but complete healing resulted.

Cyst of the Thyroglossal Duct—A Report of Two Cases.

OTTO T. FREER, M. D.,
CHICAGO.

The anatomic origin of these cysts is described by the author. Two cases are reported.

Case 1.—Male, began to have difficulty in swallowing, and at the same time noticed a swelling in the region of the thyrohyoid space. When first seen, on April 19, 1915, the swelling had increased and there was an increase in the difficulty in swallowing, so that to make solid food go down he had to try twice and help with a mouthful of water.

Examination showed a normal nose, pharynx, larynx and esophagus. In the thyrohyoid space a cyst was felt seemingly lying underneath the sternohyoid muscles. It was of walnut size and could be felt to interfere with the ascent of the thyroid cartilage to the hyoid bone when the patient swallowed—that is, the cyst became pinched between the two structures.

Operation on June 17, 1915. After dissecting off the superficial fascia and platysma muscle from a vertical median incision

ion, a strong, tendinous layer of fascia was exposed that was attached to the lower border of the hyoid bone above and to the border of the thyroid notch below, so firmly binding down the cyst between itself in front, the median thyrohyoid ligament behind and the thyrohyoid membrane laterally, the cyst being unable to escape from the compartment in which it was confined when pinched during swallowing. When exposed by removing the fascia described, the wall of the semitransparent cyst was found to be so frail that it could not be seized lest it tear. This made the dissection tedious, as only the tissue surrounding the cyst could be held with tissue forceps, the cyst being held aside with dull retractors. The cyst was removed unhurt from its bed and was found to end above in a fibrous pedicle that lay against the posterior surface of the body of the hyoid bone and could be followed as high up as its superior border at the level of the hyoepiglottic ligament. Removal of the cyst exposed the median thyrohyoid ligament to view, this ligament forming the posterior wall of the compartment in which the cyst had been confined.

Microscopic section of a part of the cyst wall showed it to be composed of fibrous tissue lined with a layer of leucocytes intermingled with numerous, evenly distributed giant cells. There was no epithelium. The cyst contained a clear fluid. The removal of the cyst enabled the patient to swallow normally.

Case 2.—The second patient was a woman of thirty-two years, first seen on November 8, 1916. She had a swelling over the larynx since her tenth year. Iodin was injected into this swelling during the summer, and since this was done the swelling had gradually increased in size.

Examination showed a spindle shaped cystic tumor of the size of a walnut in the prelaryngeal region. The upper pole of the cyst could be felt to dive under the center of the body of the hyoid bone; its lower pole dwindled to a cord that could be felt to reach the region of the thyroid isthmus.

Operation under cocain on November 17, 1916. It took two hours to dissect out the cyst, as only the most delicate handling could prevent its rupture, and inflammatory changes caused by the iodine injection had made the cyst wall grow to its surroundings, so that the thyrohyoid and sternohyoid mus-

cles were firmly joined to it in front. The upper end of the cyst ended in a cord that extended upward under the body of the hyoid bone to its upper border, where it was lost in the hyoepiglottic ligament. Below, the cyst ended in a similar cord that joined the isthmus of the thyroid gland. When freed from its bed, just before removal the cyst ruptured, thick pus escaping, a cold abscess probably caused by the iodine injection.

After the cyst was taken away, the thyroid and cricoid cartilages, upon which it had lain, were bared to view.

In the first case the possibility of the cyst being one derived from a subhyoid bursa might come into question. However, the pedicle which formed a cord passing up under the body of the hyoid bone in the location of the thyroglossal duct, showed the thyroid origin of the cyst.

In the second case the entire thyroglossal duct, expanded to a cyst in its middle, was present to prove the correctness of the diagnosis.

Report of a Case of Large Osteoma Involving the Right Frontal Sinus and Uncovering the Adjacent Brain.

JOHN F. BARNHILL, M. D.,

INDIANAPOLIS.

This occurred in a girl of sixteen years who first noticed a swelling on her forehead a year previously, which caused no symptoms, but was increasing slowly in size. The speaker was consulted because of deformity.

X-ray plates showed an oval tumor involving the right frontal sinus, with absorption of the external and internal plates of the sinus walls.

Operation August 21, 1917. An area of half an inch in circumference was wanting in the frontal wall of the sinus, and through this the hard glistening tumor presented.

The remaining portion of the frontal wall was removed by rongeur and the tumor forcibly pried out by stout bone rasps. It was attached to and extended into the infundibulum. The dura was exposed and absorbed over a large area. Some softened bone about the margin of the dehiscence was rongeured away, a light sprinkle of iodoform powder applied to

the exposed dura and brain. The infundibulum was enlarged by means of a bone rasp, a drain tube inserted, the cavity was lightly packed with sterile gauze and the external wound completely closed.

Recovery with but slight scar was entirely uneventful.

The tumor was an osteoma, weight a little more than six hundred grains, with great density.

DISCUSSION.

DR. JOHN M. INGERSOLL, Cleveland: At the meeting last year I showed some radiographs of an osteoma of the frontal sinus in a boy fourteen years old, following a blow from a baseball. He has been under observation for three years. During the first year after the operation I was very hopeful, but the radiographs that I exhibited last year showed a recurrence and that the osteoma had grown back into the brain cavity so far that it was inoperable. The tumor grew originally from the infundibulum into the frontal sinus, just as it did in Dr. Barnhill's case. The general opinion is that the tendency of these growths to recur is very marked.

We have now under observation, at Lakeside Hospital, a man who has an exophthalmos, one eye being pushed downward and forward by an osteoma growing from the external part of the orbit. The X-ray taken two months ago, compared with one taken recently, shows that the osteoma is slowly increasing, but with the known tendency of these growths to recur rapidly, we have hesitated to operate.

DR. JOHN E. MACKENTY, New York City: In the service at the Manhattan Hospital, in another department, I was interested in an osteoma of the frontal bone. It involved the frontal sinus and extended back along the base of the brain, going through to the dura. The condition is pretty well recognized under the name of ivory osteoma of the frontal bone, and it is rather serious to operate on it. This man's was due to syphilis. He had evidence of syphilis at the time. I should like to ask Dr. Barnhill whether this girl's blood was examined for syphilis. The man subsequently died of meningitis. His tumor was not operable. The consensus of opinion is that when these tumors are very large, they are inoperable because the difficulty of getting them out entirely is so great.

DR. JOHN F. BARNHILL, closing: She was an only child. There was no evidence of hereditary syphilis, and I looked on her as a perfectly well girl except for this ivory-hard tumor. I should be greatly amazed if this should turn out to be a sarcoma. I am well aware that sarcoma is more common in this region than anything like one. I should be greatly astonished if it returned. When I pried it off, it snapped from the infundibular attachments with a crack such as would a piece of marble, and in sawing through it was so ivory like that it could be compared to a billiard ball. There was no suspicion on the part of anyone that it could be sarcoma, but I know the tricks of sarcoma so well that I would not say that it is impossible for it to have been one.

Report of a Case of Prolonged Intubation.

EMIL MAYER, M. D.,

NEW YORK CITY.

A boy aged nine years had had diphtheria at the age of two, for which tracheotomy was done, resulting in a tracheal fistula, for which he was admitted to the hospital. Attempts to close by this plastic operation failed, with the result that a tracheotomy tube had to be inserted.

Stenosis of the larynx followed, which was treated by divulsion, with subsequent introduction of an intubation tube. This tube had to be removed under suspension and promptly reinserted at intervals for a period of five years, always under general anesthesia. Finally in April, 1918, the intubation tube was removed. A tracheotomy tube was inserted for a couple of days. This was removed, the wound closed, the patient breathing since through the natural passages. The writer concludes:

The special points of interest in this case are:

1. Persistent remaining of a tracheal fistula in spite of every faithful attempt at its closure.
2. A stenosis of the lower portion of the larynx due to contraction of the natural parts, and their consequent disuse.
3. The impossibility of intubating except under general anesthesia and under suspension.
4. Persistent collapse of the larynx as soon as extubated.

5. The prolonged wearing for five years of an intubation tube.

6. The ability to breathe through the natural passages after all these years, in spite of the loss of at least two anterior rings of the trachea.

To this happy outcome must be attributed, in great extent, the growth of the patient, who, from a little boy of nine, and four feet in height, is now nearly fifteen years old, and has attained a height of five feet five inches, with natural increase in size of all his organs, including the trachea and larynx.

DISCUSSION.

DR. HENRY L. SWAIN, New Haven: I should like to inquire as to the development of thyroid and cricoid cartilage, notwithstanding their disuse—do they grow in the normal way?

Answer: Yes.

DR. JOSEPH H. BRYAN, Washington: It must have taken long continued, patient work.

DR. THOMAS H. HALSTED, Syracuse: I hoped that Dr. Mayer would help me out on a case that is at present under my care. Three months ago I was called to see a child a year old which had had a mild laryngitis for several days. A general physician was in charge of the case. One night the dyspnea became worse, and I was called in. I found the child cyanosed and the dyspnea very great. Examination revealed nothing. I had the child sent to the hospital, and went there myself in my car, after telephoning for them to have the instruments ready for immediate intubation. The tube was put in immediately and a culture was made and found negative. Antitoxin was given on general principles. At the end of six days I removed the tube, but had to put it back immediately and make artificial respiration. We gave this child antitoxin during the first few days. The throat was examined repeatedly, but the culture was always negative. It has been three months now, and during this time I have extubated eight times and intubated nine times. I did a direct laryngoscopy a month ago, and found nothing but an ashy appearance of the trachea, resembling a pseudomembrane. I did not do a bronchoscopy. We sus-

pected the existence of a foreign body, and the child has been X-rayed several times, always without result. The child is perfectly well otherwise, and has gained in weight. It walks about and enjoys itself, and has no difficulty in swallowing, but I do not know how to get rid of the tube. The grandmother wants me to say that she believes that it was all due to teething. I do not know. The child has had one very slowly erupting tooth, one of the molars. It has been exceedingly painful. It has taken that tooth, which looked as if it were ready to erupt when the thing happened, until now to come through, and in the meanwhile a number of other teeth have erupted.

DR. CHARLES W. RICHARDSON, Washington: The case of Dr. Mayer's is a very interesting one. In former days, when I did a great many intubations, I occasionally met with some prolonged retention of the tube, but I think that Dr. Mayer has the record for long retention of the tube, and I wish to congratulate him on surmounting his various difficulties, especially after the loss of part of the cartilage.

May I ask whether he does not think that there was some regeneration of the cartilage later on, which caused the box of the larynx to stiffen up so that its firmness made it possible for him to eventually take out the tube and dispense with it entirely? That seems to me to have occurred in this case.

Regarding Dr. Halsted's case: Some few years ago I reported a series of cases of laryngitis hypertrophica subglottica acuta, and I should judge from what he describes that it was a case absolutely of the same character. Such is the usual history of these cases, as he describes and as I have seen them. They are usually very intractable with regard to the removal of the tube. They have in the past given me more trouble than the fewer retained tubes in diphtheritic cases, as you would naturally expect on account of the fact that the urinary trouble in these cases is subglottic in the cricoid region. Of course, when I took out the tube in these retained cases the stenosis immediately recurred or soon thereafter. It takes some time to get rid of the tube. I should not worry about it, but keep on in the same way he is now following. I have had cases last three or four months before eventually being able to dispense with the tube.

DR. HENRY L. SWAIN, New Haven: I presume that Dr.

Halsted adopted the method of giving large doses of an anti-spasmodic before attempting to take the tube out. That is often successful. You can then remove it, when you would not be able to do so if the child was in possession of all his reflexes. I have had exactly the same kind of case as Dr. Halsted. In fact, there are three in the hospital now. One is just like this, and the others are retained tube cases. I have had trouble to get rid of them. I am sorry that I forgot Dr. Richardson's suggestion, and I think that this explains the situation perfectly. However, I did try to look upward in one of the cases. I was called in consultation and thought that it would be a good thing to do a tracheotomy and take the tube out. At the time of the operation and later, I tried to look in from below and see the condition of the larynx and find out what its interior contained, but without success. Some time after the tracheotomy this child had a sudden choking fit and died. We could not explain the matter, unless it was general uremia. The other children got well, but in these we had almost to stupefy the patient before we could get the tube out and have it stay out. In one case we had to keep the child under the narcotic for a whole twenty-four hours. These two children are all right now.

DR. EMIL MAYER, New York City, closing: Replying to Dr. Richardson's question, I would say that perhaps there was not so much reformation of cartilage, but that on account of the long continued presence of the tube all the tissues about the trachea became as hard as whipcords. So we had almost bony ridges on each side, which served to prevent the collapse that surely would have occurred from the falling in of the soft parts.

Regarding the case that the chairman presented, it does seem that an acute laryngotracheitis of some kind was the original cause requiring intubation. Dr. Lynah, in a masterly paper on "Prolonged Wearing of Intubation Tubes," recently called attention to the immediate collapse that takes place in many instances when the tube has been removed, requiring a hasty reintubation. In fact, he tells of a case in a boy who was extubated and returned to the ward. The boy was under the impression that the tube was still in situ. He was kept in the hospital for some time, and every time he misbehaved they threatened

to remove the tube and he immediately behaved. The tube was not there, but he thought it was. I would suggest to Dr. Halsted to introduce a much larger intubation tube next time, and when he does extubate to have the patient under some opiate, so that the general reflexes would cease, watching over him for that time of immediate danger and the likelihood of having to do a tracheotomy.

Regarding the question of Dr. Swain, as to whether the patient did not receive quantities of antispasmodics, I would say that the boy was never extubated except under general anesthesia. He has been receiving an eighth of a grain of morphia, and then being completely anesthetized while the tube was removed for cleansing, and this latter had to be done in a hurry. He has been anesthetized over twenty-five times, and each time the anesthesia became more difficult because he was pretty well soaked with the drug. I hope that we shall not have to do any more for the little chap because he has been very brave. It certainly was to me a most interesting case, and one of the most important deductions that we can make is the wonderful tolerance of the larynx. The keeping of a tube in a larynx for a month's time seems to make no difference to him.

The Surgery of Laryngeal Malignancy.

HUBERT ARROWSMITH, M. D.,

BROOKLYN.

From the author's observations of MacKenty's work and his own recent experience, modeled very closely thereon, he is inclined to tentatively suggest the adoptions of Moure's antecedent tracheotomy, to accustom the lower air passages to the direct impact of air, which may lessen their immediate postoperative irritability and susceptibility; the tracheal opening to be made high, as Jackson has indicated, because that will not interfere with the later mobilization of the trachea. Otherwise the two step operation seems to offer no special advantage. This is the ideal field for the employment of oil-ether colonic anesthesia, as devised by Gwathmey. It makes the whole procedure infinitely easier for both patient and

operator. Even if really painless under local anesthesia, such an ordeal produces an enormous apprehension which cannot but be detrimental to the patient, and the degree of infiltration of the tissues necessary to produce insensitiveness must interfere with their repair. With rectal anesthesia laryngeal spasm does not occur, bleeding is very much less, there is no tracheobronchial irritation from the directly inspired anesthetic, which very largely obviates the necessity for subsequent repeated applications of the suction apparatus—in itself an agent of some danger—and there is much less likelihood of postoperative vomiting, most undesirable under these conditions.

The laryngologist for every possible reason is the man who should do laryngeal surgery, both external and internal. If he saw all these patients at an early date, thyrotomy would more often be performed.

Laryngectomy cannot be repudiated on any such grounds as the mutilation, or the loss of voice. Laryngectomized patients are in no worse case than the blind, the deaf or the helplessly crippled. Many of them seem to get a fair amount of happiness out of the mere fact of existence, and are not by any means incapable of self support. In judiciously chosen cases this operation offers a good deal more than a probability of clinical cure, and in most instances a definite retardation of the fatal ending.

Of two cases operated by the writer, one died six weeks later of pneumonia. The other is in good condition, now six months after operation, and at work.

A third case in whom only a tracheotomy was done, his final sufferings were so great that the author regrets that he did not give the patient "a fighting chance by as farreaching a dissection as possible," rather than witness such sufferings as this man endured during the last six months of his life.

DISCUSSION.

DR. JOHN E. MACKENTY, New York City: The main trouble is that the cases come to us too late for any hope of permanent cure. Of twenty-three cases seen by me since last September, seventeen were inoperable, except in the way of alleviation. Only one case of the twenty-three was incipient.

Now, that is a terrible commentary on the present condition of the diagnosis of this disease. There is a fault somewhere, and, as Dr. Arrowsmith says, I think it is largely with the general practitioner, who does not take notice of the early symptoms. Anyone of cancer age complaining of hoarseness which lasts for more than six weeks should be under observation. There is no question that the mortality has decreased during the last few years. Up to seven or eight years ago it was very high. At the present day, those taking this work up have a different experience, and find the operative mortality much lower. I think that care in the technic will reduce the operative mortality to a very small fraction.

Partial laryngectomy is an operation seldom required. I have added no cases of this procedure to the former record. I have seen none requiring it. Besides, hemilaryngectomy is more dangerous as an operative procedure than total laryngectomy. I think that a lot depends on getting the cases over the surgical end of it, on the postoperative treatment, more than we realize; it is the neglect of the small details following operation that produces the mortality.

I am wedded to the one stage operation, but I am not prejudiced, I hope, and see some reason now in the use of the high tracheotomy that does not in any way injure the trachea. I object to the other because it injures the trachea.

I have been impressed by Dr. Arrowsmith's exhibition of colonic anesthesia. Having seen it used in this type of operation, I am going to give it a thorough trial. I believe that in colonic anesthesia we have made an advance in this work, because it lessens the amount of hemorrhage and of blood getting into the trachea, which I consider very important in guarding the patient against pneumonia.

DR. CORNELIUS G. COAKLEY, New York City: It would seem to me that a one-stage operation is, in some cases, much to be preferred to a two stage operation. If the growth is small, and you can afford to wait for the adjustment of the respiratory tract to the new method of breathing, all right; but if the case is likely to result in total laryngectomy the one stage operation is to be preferred.

DR. ROBERT CLYDE LYNCH, New Orleans: I have now six cases of intrinsic carcinoma of the larynx that I have oper-

ated on under suspension. Four of these patients are perfectly well at the present time. In the remotest case, it has been four years since the time of operation; in the most recent, about eight months. So far, there has been no recurrence, but I want to be sure that you understand that it is not good advice to give you at this time to operate on cases of intrinsic carcinoma of the larynx by that means. I am afraid that some men might think that this is an operation of choice and do it, and thus do more harm than good. In the second place, it would seem to me that as we progress along the line of study of operation for carminoma of the larynx, the operations are going to divide themselves into two types—the thyroidotomy and the laryngectomy types. The cases requiring hemilaryngectomy will, very likely, give much better results under total laryngectomy. I have had seven cases with five cures and no immediate deaths, within ten days from the operation. The recurrence taking place within ten months in the shortest time. That is, the patients who got the least benefit from the laryngectomy lived ten months, and in this particular case he was especially grateful for this added period to his life, in order to wind up his affairs so that he might leave them in shape for his family. Five of these patients are perfectly well up until the present time. Three of them are farmers who have been through three crops. That is, they have planted and harvested their crops three times, and their families have been provided for by that means. The others are clerks, and all are particularly happy and grateful. All can do without pad and pencil, in that they have been able to develop a type of speech that is understandable by their associates.

My procedure has always been by means of a preliminary tracheotomy, and at first low down, but now high up. I have not seen any cases in which the tumors have grown so large within two or three weeks following the tracheotomy as to make me feel that the tracheotomy itself had jeopardized the patient's welfare as far as his recovery was concerned. Giving always the ether vapor anesthesia, and giving the vapor through the tracheotomy tube has certainly facilitated every manipulation during the operative procedure. I now take away with the larynx the superficial thyroid muscles, the

sternothyroid and sternohyoid, that group of muscles overlying the anterior face of the larynx.

I first started rectal feeding after the operation, but that has been supplanted by the use of the nasal tube or the introduction of the small catheter, just as one would do with a stomach tube, keeping the end of the catheter out of the stomach; that is important, in order to get away from the nausea or postfeeding vomiting. The tube should be inserted down to the neck, so that the esophagus may take care of the swallowing to the stomach.

The method of the care of the trachea, to me, has seemed very important. I pare the trachea and larynx, and attempt to separate at one point the trachea from the esophagus, and then I put in a tape, so that I may hold the trachea up until it is bent in that fashion. When things are ready I cut the trachea from above down, and the only bleeding that occurs is from the mucous membrane of the trachea. Before the trachea is cut a heavy silk suture is put in and held by an assistant. This prevents any blood from going down into the trachea. The anesthesia is carried on through a very small tracheotomy tube, which lies in the opening, and is also under the care of the assistant, who steadies the trachea. He has nothing to do but be sure that nothing enters the trachea. I do not know whether that is what keeps us from pneumonia or not, but we had no postoperative disturbance, and the remarkable gain in weight and the comfort that these people enjoy after the removal of the mass make it well worth while. It does seem to me that laryngectomy is not nearly so bad a thing for the patient as one would gather from reading the older articles on these subjects.

DR. HARMON SMITH, New York City: The reader of the paper cited a report of a case made by me. Last week I saw the woman. Her voice has returned, and she has gained in weight, although that was not necessary, as she weighed two hundred pounds to begin with. I believe that it was of low grade malignancy, of a papilloma carcinomatous variety.

DR. D. BRYSON DELAVAN, New York City: Yesterday morning I exhibited to a number of members of the society a patient who had been operated on by a friend of mine in New York City twenty-one years ago, two-thirds of the larynx

being removed, and he is perfectly well today. That is one of the few cases followed and the end results studied.

DR. HUBERT ARROWSMITH, Brooklyn, closing: The plea I make is one of the utmost importance. If we are going to reach conclusions we want to know what becomes of the patient. Perhaps we do not all realize that our distinguished honorary president, Dr. Solis Cohen, was the originator of this method of handling the stump of the trachea, an invaluable step in the after treatment of laryngectomy, and I think that he was the first to do a laryngectomy in America.

DR. J. SOLIS COHEN, Philadelphia: I was not the first to do a laryngectomy, but the first to report the case.

A Carcinoma of the Epiglottis and Root of the Tongue Removed by the Simpson Radium Needles, With Description of a Needle-Placing Instrument.

OTTO T. FREER, M. D.,

CHICAGO.

Dr. Frank Edward Simpson of Chicago in 1914 devised short, hollow needles one and one-sixteenth of an inch long and one-sixteenth of an inch thick, made of steel and platinum plated with gold, the cavity of the needle being packed with twelve millimeters of radium sulphate, which is sealed within the needle after the detachable eye portion of the needle has been screwed down upon its hollow shank. The wall of the hollow needle is three-tenths of a millimeter thick—thick enough to filter out the irritating alpha and softer beta rays, while permitting the hard beta and gamma rays to pass freely through the wall of the needle.

The needles are stout enough to endure the firm grasp of a needle holder for their introduction into the tissues.

With several Simpson needles the effective so-called cross-firing of radium rays may be produced—that is, instead of the radium rays proceeding from a single source in the center of a growth it is easy to place a number of needles at its periphery as well as in the center, so that not only is the growth evenly influenced by multiple radiation, but the apparently healthy zone about the tumor is deeply penetrated by the rays, so helping to prevent a local return of the growth.

A valuable quality of the needles is their comparatively easy insertion, so that only occasionally, where a tumor is tough and resistant, is it necessary to place them in a preliminary knife cut, for as a rule they may be directly thrust into the growth.

It is generally agreed that malignant tumors should be destroyed at one sitting by one very large dose of radium. This is not only done in order to minimize the danger of metastases risked by waiting for the effect of lesser doses at intervals, but it is experience that the effect of a single large dose is proportionately greater than that of the sum of smaller ones that equal it in quantity. It has also been found that a tumor is less influenced by later doses than by the first one, a species of tolerance being established for radium. The demand for a single completely effective large dose of radium rays is filled by leaving the Simpson needles in place for from nine to twelve hours. Their efficient screening prevents the undesirable integumental burns that were so common before it became known that the soft beta rays and the alpha rays must be filtered out.

The difficulty in accurately inserting the needles with forceps in this case, the roughening of the surface of the costly needle by the blades and the annoyance caused by the dragging thread that trailed the needle, led the writer to construct a needle placer for inserting the needles, a device which in the case of a carcinoma of the laryngopharynx just treated has permitted their exact introduction into the flesh with an accuracy and ease that, he thinks, will make it possible to needle even intrinsic carcinomas of the larynx by the indirect, mirror method of laryngoscopy, a method so much less distressing to the patient than direct or suspension laryngoscopy.

Observations on Pneumococcus Infection of Nasal Accessory Sinuses.

CORNELIUS G. COAKLEY, M. D.,

NEW YORK.

One hundred and eighty-eight cases were observed. The acute ones with the history of a duration of one month or less numbered one hundred and nine. The remainder were chronic.

Pneumococci were present in forty-four per cent of the acute cases, and in most of these they were the sole organism. In the chronic cases this organism was found in but thirteen per cent.

These results seem to warrant the inference that in acute inflammations probably half the cases might be due to auto-infection, while the other half were due to infection from some outside source.

In the chronic cases the larger number were accompanied by autoinfecting organisms.

The author records a case of pneumococcus tonsillitis followed at an interval of two weeks with a pneumococcus infection of the left antrum. In the second case both antra were successively involved, one at a later period than the other, with a pneumococcus in each instance.

The third case had beginning infection in the larynx and trachea, secondarily involving his antrum, with pneumococci.

The fourth case had a bilateral maxillary sinusitis; there was a pure culture of the pneumococcus in both. Signs of consolidation were found at the base of the right lung next day, and antipneumococcus serum was administered, followed by a chill, rising temperature to 106° , and an immediate drop in the temperature with pneumococcus in his sputum, without any further attention to his antra, as the patient was too ill to be treated. Spontaneous recovery followed.

The writer asks what rôle the serum played in curing his maxillary sinusitis?

The fifth case recorded was the wife of the preceding patient, with pure culture of pneumococcus from the discharge, evidently following infection from her husband.

The sixth case was one of an acute otitis with pure culture of the pneumococcus arising from an infection of the same character in the left antrum.

From a study of this series of cases the writer feels justified in drawing the two following conclusions:

First.—Pneumococcus infection of the nose and its accessory sinuses does not in any large percentage of cases result in a pneumococcic infection of the lungs. Only one of our cases developed pneumonia.

Second.—There would seem to be direct evidence that in

one of the cases the infection, pneumococcus I, was transferred from husband to wife.

We hold that most severe acute rhinitis attacks are the result of infection, either with autogenous or foreign bacteria or viruses. The presence of pneumococcus rhinitis and sinusitis during the stage of profuse secretion, accompanied by coughing and sneezing, must be a fruitful source of disseminating pneumococci, some of which may only invade the upper air passages of the victims of the infection, while in other patients, finding a suitable soil in the deeper air passages produce a pneumonia. There is abundant evidence that pneumonia is infective, and may not one source of infection be in these pneumococcic head colds?

DISCUSSION.

DR. CLEMENT F. THEISEN, Albany: Some time ago I published a paper on "Pneumococcus Infection of the Nasal Cavities in Children," which was based on a small epidemic that I witnessed in the Child's Hospital in Albany. In these cases the children ranged from four to fourteen years of age, and numbered not over half a dozen. We obtained in all the cases the pneumococcus from the nasal secretion. In two cases there was a marked exophthalmos with serious ethmoidal and frontal involvement. These two children were operated on and made good recoveries. We had one death, in a child of four, with sinus involvement and a high temperature. Pneumococcic serum was administered without effect. In all the cases there was profuse nasal discharge, very high temperature and very serious involvement of the cervical lymphatics, and the pneumococcus was obtained in pure culture from the nasal secretion.

DR. HENRY L. SWAIN, New Haven: I had three cases this winter in which the pneumococcus Type 1 was found, and in which the immediate onset of pneumonia necessitated the calling in of an internist, in order that the necessary attention might be given to the chest condition, so that I could not follow the case for a number of days. Two of the three cases recovered and one did not. The sinus condition absolutely cleared up within three days after the administration of the pneumococcic serum in those that recovered.

DR. CORNELIUS G. COAKLEY, New York City, closing: The only case in which the question of giving pneumococcic serum of Type 1 was the one in which the serum was very efficacious. I was surprised to find that from such a severe attack the patient recovered from his sinusitis without further treatment. Of course, they might have recovered without it. Some recover without treatment.

The Diagnosis and Prognosis of Hypertrophic Sphenoiditis.

GREENFIELD SLUDER, M. D.,

ST. LOUIS.

Of the utmost importance is the kind of light to be used in postnasal examinations. Sunlight would be ideal were it not for the great heat conveyed which renders it useless.

The light made by Leitz under the name of the "Lilliput Arc Lamp" is as satisfactory as the sun and always available. The carbons meet at right angles and give a brilliant white light which is condensed into a pencil by a convex lens. It is a different light from that of the arc lamp used in street illumination. In burning, a little white smoke is given off, which condenses to a white powder, indicating that the carbons have been impregnated with a zinc salt which may be the way in which the white light is made. Leitz declines to tell the process of manufacture.

The advantages of a proper light are obvious, in that diseased conditions, as also the presence of a small amount of pus, are the more readily recognized. At times the Holmes nasopharyngoscope is of the utmost help by virtue of the right angle vision.

The author presents a clear description of the normal postethmoid-sphenoid district.

All changes in these parts should be carefully noticed, because a very slight surface change is often accompanied by much more advanced and serious change in the deeper parts, as is often shown by the finding of polyps within the cells at the time of operation, no evidence of which was previously recognized there. Patches of inflammation may often be found with the pharyngoscope within the cells which are very

pernicious and disastrous according to their location, for example, upon the optic canal.

He does not believe that the postethmoid sphenoid operation is free of danger in the hands of any rhinologist. He has seen the eye, which it was intended to save, lost for the vision it had at the time of operation, and he had learned of death following a number of these operations. Sometimes a sphenoid sinus makes the inner part of the canal, and sometimes the postethmoid makes it, and there is no way to tell in a patient at the time of operation which it is, hence the sure practice is to do the combined operation.

The distribution of the hyperplastic process here is of great interest and various.

The presence of pus is not the only indication of diseased conditions here, as there may be active inflammatory conditions without it. The author calls attention to the appearance of the epithelium under different conditions. With a proper light, when pus is present it is almost invariably greenish yellow or yellowish green, whereas the opaque epithelium is white or very slightly bluish white.

This form of sphenoiditis is rarely unilateral. Anomalous anatomic arrangements of these parts exist, and failure to bear these possibilities in mind may defeat our best technical efforts, and these anomalies are described. The diagnosis becomes exceedingly difficult in children.

As to prognosis, the infection "coryza" in these parts may be of grades so slight that the patient is not cognizant of it and still make the ocular or the painful lesions. The acutely inflamed area may, however, be seen with the pharyngoscope after the cells are opened. And for the second class of cases the prognosis is also for relief, but it must needs be slower and less complete, although in the long run the result is pre-eminently worth the effort it took to get it. These cases have seemed to be less disturbed by coryzas.

The postethmoid sphenoid radical operation, properly performed in the first class of cases, almost always gives a technical result that remains satisfactory—that is, the openings of the cells remain as the operator makes them. In the second class they almost always get smaller, and very frequently close

up completely, and so must be made again, often several times.

In later life an involution of the hyperplastic changes—rarefying otitis—takes place. Sometimes beginning about the fiftieth year and sometimes later. The author has seen this in unoperated cases accompanied by corresponding cessation of symptoms (in one case an ophthalmic migraine).

The Value of the Dichloramin-T Chlorcosane Solution (Dakin-Dunham) in the Treatment of Infections of the Upper Air Passages.

D. BRYSON DELAVAN, M. D.,

NEW YORK.

Dichloramin-T, the basis of the Dakin-Carrel fluid so extensively used as an antiseptic in a wide variety of infectious conditions, has an intense germicidal action corresponding to its high content of chlorin. It is difficult to find for it perfectly satisfactory solvents which will yield stable solutions. Drs. Dakin and Dunham state that the best medium thus far found is an oil obtained by the chlorination of paraffin wax, to which has been given the name "chlorcosane." Other solvents experimented with are a mixture of eucalyptol and paraffin oil, and a heavy oil obtained by the chlorination of eucalyptol. Eucalyptol has been found to be irritating. Chlorcosane is not irritating and has seemed decidedly preferable. Explaining the action of dichloramin-T in oil, Dr. Dakin says that antiseptics incorporated with or dissolved in oily substances usually possess little if any antiseptic activity because intimate contact with the infected matter is hindered by the oil. When, however, the dichloramin-T solution in chlorcosane are brought in contact with aqueous media the partition coefficient between the oil and the water is such that a certain amount of the dichloramin-T passes into the water and there exerts its germicidal action. The amount of the dichloramin-T thus passing from the oil is increased by the presence in the aqueous medium by substances capable of taking up chlorin. So that the oil solution seems as a store for the antiseptic which is drawn upon to maintain the germicidal activity of the aqueous medium with which it is in contact. The dichloramin-T

oil solution may be sprayed upon wound surfaces or poured into accessible parts of deep wounds. It yields moderate amounts of the antiseptic to watery media, such as secretions from wounds or mucous membranes. It is suitable for sores requiring prolonged antiseptic treatment and for first dressings of wounds which do not require irrigation. The application of the oil is extremely simple, and generally it need not be renewed more than once in twenty-four hours.

Admitting the germicidal power of dichloramin-T, it is desirable to study its value in the disinfection of septic conditions of the upper air passages, regions especially liable to infection, prone to harbor germs of dangerous character, abounding in recesses difficult of access by the ordinary means of application, and often becoming foci of infection threatening extreme danger. This is especially true of the upper nasal region, the vault of the pharynx and the tonsils. The dichloramin-T may be used to advantage in these regions under three different conditions:

1. To prevent the extension of newly acquired infection.
2. To overcome the acute results of infections, and
3. To abolish the bacilli persisting in carriers.

The success of the method must depend upon the thoroughness of the application of the disinfectant. Brushing the surface of the tonsil or spraying the lower section of the nasal cavity cannot possibly be effective. A spray atomizer must be used which will carry the spray in all directions, upward, downward and sidewise.

The crypts of the tonsil must be disinfected to their lowest depths, and the superior half of the nasal cavities must be thoroughly reached. To effect this the following principle must be recognized and carried out: The parts must first be cleansed, and then exposed to the fullest extent by the application of adrenalin or some similar astringent, and finally the dichloramin-T oil sprayed into them until every crypt and recess has been completely reached. This thoroughness is absolutely necessary in order to secure the removal of the most deeply seated germs.

Used in the strength of two per cent or less, the solution with chlorcosane is not irritating, although stronger solutions

may be. Suitable atomizers are necessary. The success of this method has thus far been gratifying.

Where this method fails, in the presence of hypertrophied tonsils or adenoids, the removal of the latter may be necessary to effect a final cure.

The desire of the author is to furnish a method so simple in itself as to be readily carried out by the average practitioner, with the aid of apparatus inexpensive, durable, clean, compact of form, light of weight and therefore available for use under all circumstances of medical practice, whether civil or military.

The essentials to success are:

1. Recognition of the principle of the necessity for the complete exposure of the centers of infection.
2. The use of a proper spray atomizer.
3. The devotion of sufficient time and care to the effective carrying out of the treatment.

DISCUSSION.

DR. JOSEPH H. BRYAN, Washington: I believe that this method of treatment is going to be of valuable assistance to us in correcting these conditions. I cannot understand how the spray can get into the deeper portions of the tonsils, however. I have been using a small dental syringe, by which the solution can be carried into the depths of the tonsil better than by the spray.

DR. ROBERT C. MYLES, New York City: I have been experimenting for several months with these preparations of Dr. Dakin's fluid, although nothing definite has resulted. A great many of the cases seemed to have been relieved, and it would seem theoretically that it is the best thing that has been proposed. I have used it in solutions and mixtures, and the difficulties in reaching the depths of the crypts need, I might say, some consideration. Many of us have been trying to swab out the depths of the crypts and have always produced a certain amount of hemorrhage on account of the delicate structure of the parts, leaving a blood clot to be a culture medium for the germs. I have used also the watery solutions in tracheobronchial conditions, and so far the results have been very satisfactory. I do not believe that I have a case which apparently was pneumonic that has not stopped. When the

oily solutions were used a great deal of precaution was observed in dropping them into the trachea, and spraying came in readily with the watery solutions. I preferred the latter, on account of my faith that too much paraffin oil going into the lower bronchi might not be brought back again. Not being observable, it was a question what would become of it

DR. CORNELIUS G. COAKLEY, New York City: Chronic meningococcus carriers in the Rockefeller Institute were examined one afternoon by myself. The conditions found were almost identical in all—a most intense hyperemia, redness, with moderate swelling of the nasal, nasopharyngeal and pharyngeal mucus membrane. I have never seen such red throats, and none had had during the past four days any other local treatment so that I could not find any conditions there that were the result of local treatment. Of the twenty-seven, twenty-four had perfectly enormous masses of adenoids in the nasopharynx. I have rarely seen such masses of adenoid tissue in adults. They were great big husky men from the Middle and Far West, fine specimens of manhood, yet with masses of adenoid tissue bigger than my thumb, as proved by removal by Dr. Babcock later. In twenty-four that was the size. In two there were smaller amounts, and in one, none. One patient had a sinus involvement. I feel that neither the dichloramin-T nor any other local disinfectant can have any great bactericidal or germicidal value when we find such masses in the nasopharynx as were present in these twenty-four cases. I believe that this was the cause of continued finding of the meningococcus. The results of operation will be noted later on. Last fall I had a smaller number, about ten, who were sent from one of the cantonments of the South to the Rockefeller Institute for study, and we found in all large tonsils and adenoids. When these were corrected, they promptly cleared up in two weeks, and they were long standing cases. So I think from what little I know at present, that if you have a smooth surface which can be readily acted on by the antiseptic, dichloramin-T, you will get good results, but if you have a rough surface its efficacy is much less.

DR. HARMON SMITH, New York City: I have had more or less success in employing this solution, beginning with dichloramin-T chlorcosane, in February. I believe that the most

important point is to have the surface clean and the sinus clear of any invading pus or mucopus found there. In addition, we should not only bring the solution in contact with but force it into these rugæ. I have shrunk the tissues down first, and then irrigated with an aqueous solution of some alkaline or normal saline, and afterwards instituted suction until there was no evidence of pus in the solution coming away. Then I have employed a syringe, which I have endeavored to impress on some as being efficient. It is loaded as an ordinary syringe, with a two per cent solution of dichloramin-T. Then, by turning the stop cock, I bring about a vacuum in the sinus, after which I turn the cock and force the solution in, using the vacuum together with the force of the syringe to force in the solution. I have had more success with the dichloramin in oil than with the aqueous solution. This method has been more or less condemned by some, and they may have their reasons for it, but in my hands it has met with considerable success. In addition to the treatment of the patient it is necessary for the patient to do something in the interim between the calls at the office. I give the patients a weak solution of adrenalin, with which they spray their noses first, and later with a normal salt solution they irrigate the nose until the first outpouring of mucopus is over. I also give them a bulb that will give, on the Sorenson machine, a ten degree registration on the dial. Employing this at home, they can keep the sinus more or less free from mucopus, and one then has less to get out in the office before employing the injection with the syringe.

DR. EMIL MAYER, New York City: My experience with this solution in oil many months ago was that it produced so much irritation in the cases of otitis that I was rather chary about its use in cases in which there was much sensitiveness of the mucosa, so that I have recently been using the watery solution in cases of bronchiectasis and bronchial abscess, washing them out, and at the same time using the suction apparatus, and then throwing in the watery solution. I took a number of the cases that were under observation and, for control, used the old solution of iodine and carbolic acid, and in the others I used the chlorococaine. The site of application is in the bronchus. Drawing out the very excessive secretion by means of

the suction apparatus, which was attached to a double tube, the irrigation could be continued while the suction was being used. Our experience has been of such short duration that I am unable to do more than report a decided amelioration of the worst symptom of the patients, the odor. Whether we can use a solution in oil in the bronchus remains to be seen. I will experiment later on, and hope to get better results with the oily solution.

DR. ROBERT CLYDE LYNCH, New Orleans: I have used dichloramin solutions, both aqueous and oily—the oily in two per cent as described. In the sinus cases, especially the antrums, a few of the sphenoid involvements and four bronch sinus cases we irrigated the sinuses first with normal salt solution, following this by irrigation of the sinus with the aqueous Carrel-Dakin solution. Then we instilled into the sinuses—and antrum, frontal and sphenoid—thirty minims to a dram of the oily solution. This was naturally followed at first by an apparent increase in the inflammatory state of discomfort which lasted on an average for about six hours. On the return of the patient the following day, we washed from the sinus apparently more secretion, but it was usually changed in character. That is, instead of the secretion showing a tinge of blood or being bloody, there was on the patient's return what appeared to me to be an excess or an irritation of what would be a normal mucous membrane. In other words, the washing from the sinus lost the peculiar mucopurulent sanguinous type, and was changed to a thinner watery discharge having a considerable amount of apparently clear mucus. In the cultures taken from these washings there was a notable decrease in the diplococci, but the usual history of the time of clearing up of the sinus did not seem to be shortened to any great degree. In other words, running parallel cases, we found as the winter wore on, that we were able to accomplish almost the same results by irrigating the sinuses with a normal salt solution or with a solution of permanganate of zinc. We were able to accomplish convalescence in about the same time as with the dichloramin solution. We then tried simply washing the sinus with a plain tap water, following that with the instillation into the sinus, through the canula, of from one to two drams of two per cent dichloramin oil and allowing that

to remain in for as long as it would stay, requesting the patients to sit upright and refrain from blowing their nose. They apparently kept the fluid within the cavity for quite a considerable period of time—so much so that even on washing it out the next day you were able to detect distinctly some remaining odor of the chlorin. This plan was followed by the same reaction, but the convalescence in these cases was cut down apparently from two to four or five days. After the instillation of the first oil and the washing of the second day, we instill the oil for the second time. Then, if the symptoms were not too violent, we refrain from any further intrasinus medication. We did not try to wash the sinus out, but allowed the oil to stay in and gave the sinus a period of rest of about four days. In these cases the convalescence was shorter, the pain was less, and the patients came through in a most satisfactory manner. We used the dichloramin oil on tampons in cases of acute suppurative otitis requiring tympanotomy, and found that the first reaction was, as Dr. Mayer suggests, quite marked. The drum would be reddened, the canal would be reddened, but with a period of twenty-four hours of rest, the discharge would change in character from the serosanguinous discharge to one made not of blood but of an excessive secretion of what apparently was normal mucous. In other words, the secretion was white and clear. In the acute suppurative cases, some of them we felt were aggravated by the use of the dichloramin oil tampons, and we discontinued their use, not being able to accomplish the convalescence of the individual in any less time than we had by other means. We used the dichloramin oil in the acute tracheal cases, cocainizing the trachea rather thoroughly and introducing into it, by means of a tracheal canula or syringe, thirty minims to a dram of the dichloramin oil solution. This was followed in one or two instances by considerable spasms of short duration, but by very rapid amelioration of the symptoms. In other words, that peculiar dusky red, that intense redness of the mucous membrane, could be seen to be much less upon the next examination. The cough was less, the distress was less, and these cases of what we diagnosed as acute tracheitis cleared up apparently very much more rapidly by the use of the dichloramin oil than they did by other

means that we have been using before, but as far as the use in the sinus is concerned, we were not able to feel that we had been giving something which shortened the period of convalescence. In the ear cases, some of them were made worse, apparently worse, by the application and we discontinued its use. In the tracheal cases we saw real, decided benefit.

DR. J. PAYSON CLARK, Boston: I learned that it was important to avoid the use of any metal in the canula or syringe in its application. I should like to report one case of chronic pansinusitis in which all the sinuses had free discharge from them. In this case I used this solution. I washed the antrum out, and the left sphenoid was involved. I washed it out with normal salt solution and boric acid, and irrigated the sinuses—the right and left frontal, the left sphenoid and right antrum—with a Dakin watery solution. The patient went home and had a headache and so much malaise that she went to bed. She absolutely refused to have me continue this treatment, although she was better the next morning.

CLOSING DISCUSSION.

DR. D. BRYSON DELAVAN, New York: Formerly when eucalyptol was employed, that solution was found to be irritating. For that reason Drs. Dakin and Dunham devised the "chlorocosane." Almost anyone with a little experience in chemistry can prepare it, but the Abbott Company furnish it under the formula of Dr. Dakin.

Regarding the important subject of disinfection of carriers, I know nothing that has come out on this subject better than the candidate's thesis of Dr. Friedberg in the last volume of our Transactions. Not only may the crypt of the tonsil contain the offensive germ, but it may penetrate into the tissues of the wall of the crypt to such a considerable depth that even when the disinfectant is brought into contact with the wall of the crypt it does not reach the buried microorganism. The disinfection of the sinuses, too, is a difficult matter. Friedberg believes that when infection has persisted for three or four weeks in spite of treatment, then operative measures are distinctly indicated. There may be some cases in which operation, however, does not seem expedient with them. If we can find a reliable disinfectant we are in a much better position than we should be without it.

JOINT MEETING OF THE AMERICAN LARYNGO-
LOGICAL ASSOCIATION AND THE LARYN-
GOLOGICAL, RHINOLOGICAL, AND
OTOLOGICAL SOCIETY.

The joint meeting began with a Symposium on Bronchoscopy, the first paper of which was one entitled "Localization of the Tracheobronchial Tree; Preliminary Report of a New Method," by Dr. Chevalier Jackson, Philadelphia, Pa.

**The Bronchial Tube: Its Study by Insufflation of Opaque Substances
in the Living.**

CHEVALIER JACKSON, M. D.,

PHILADELPHIA.

1. In intrabronchial insufflation with opaque substances, in the living, we have a measure of the greatest usefulness in mapping out the tracheobronchial tree in foreign body cases in which a foreign body is far in the upper lobe bronchi or in other small bronchi that cannot be entered by the bronchoscope. A stereoscopic pair of radiographs will show the bronchi in situ in the living, and the bronchi can be followed in the fluoroscope.

2. The intrabronchial insufflation of dry bismuth subcarbonate, through the bronchoscope, in sufficient quantities to cast a shadow did not produce any untoward symptoms, and the bismuth totally disappeared from the lung by expectoration in twenty-four hours.

3. The insufflation of dry powders and the injection of opaque fluid mixtures through the larynx gives a degree of visibility of the trachea and larger bronchi in the radiograph; but the results are not as good as when the insufflation of a dry powder is done through the bronchoscope.

4. The method is available for an enormous field for investigation of the action of the living cilia, in health and disease, the lymphatic drainage of the lung, the mapping out of bronchiectatic and abscess cavities, etc.

Suspension as I Use It Today.

ROBERT C. LYNCH, M. D.,

NEW ORLEANS.

The patient lies flat upon the table with the head extended; the crane is attached as far back on the table as is possible, allowing only sufficient room to turn the handle which moves it horizontally; the vertical position of the crane will now be on a line with the patient's shoulders. The mouth is open wide by placing an ordinary mouth gag in the left angle of the mouth, and this is steadied by the assistant, who has only to keep the head extended in the middle line, there being no need for support, since the head is resting on the table. The hook is the same in its every detail as presented to you before, and we have done away with the long tooth plates and dental spoons. The gag of the hook, instead of being closed, is now introduced sufficiently open to permit a view of the tip of the spatula.

Instead of passing the spatula along the postpharyngeal wall, he now follows down along the base of the tongue until the epiglottis is seen, then it is lifted with the spatula just as one does in bronchoscopy, and by this time the short tooth plates will fall behind the teeth, when the gag is opened wide to fix the tongue and epiglottis. Now the hook is placed upon the crane and the worm gear joint turned to bend the hook slightly to an obtuse angle. The crane is lifted in the vertical to flatten the base of the tongue, and this will raise the epiglottis so that the larynx will come into view. If the view in this position is not already sufficient, then by moving the horizontal crane towards the head of the table will bring the anterior commissure into view far better and much easier than the old method.

This differs from the older technic in that the head is flat upon the table, and any untrained assistant can hold it steady, and the patient is not dragged over the top of the table as before, and the mouth is wide open with a gag giving plenty of room for the introduction. There is no necessity for the table to be cut, as has been described, nor for the projecting platform, since the crane is attached far back on the table be-

hind the patient rather than ahead of him. There is no danger of dropping the patient from the crane or from the spatula, since the head is not lifted from the table, or, if so, just enough to procure sufficient tension to flatten the tongue.

The view is much more natural, and, if anything, clearer and less distorted, since there is much less tension at the region of the hyoid bone and the base of the tongue. The vocal cords, instead of being stretched anteroposteriorly, are now more relaxed, as shown by the respiratory movement under ether, and by the tones emitted under cocain. This, of course, permits of more accurate dissection, especially when removing the small tumors, such as vocal nodules. One looks now down the spatula along the line of the trachea and can usually see the bifurcation, as is shown by the possibility of introducing a bronchoscope deep into either bronchus.

In the old way, one looked from below up along the spatula, and it was impossible to get the bronchoscope further down than the fourth ring of the trachea. Consequently, in this new position, there is really no need for a table that can be elevated, though it is always a comfort for any operative procedure. Finally, the patient will complain much less of after pain about the angles of the jaw, back of the neck and of headache. There is much less danger of pinching the tongue between the spatula and the teeth of the lower jaw, and it is much easier, more rapid and more accurate to introduce in this way than the old way.

Some Original Methods of Treatment of Laryngeal Stenosis.

SAMUEL IGLAUER, M. D.,

CINCINNATI.

For patients who are wearing a tracheal canula, the author follows the same principle which underlies the use of rubber tubes in laryngostomy, which has the advantage of being employed without the necessity of splitting the larynx.

The methods used are:

1. Dilatation by means of a rubber tube doubled upon itself. The length of the tube when doubled should approximate, as nearly as possible, the distance from the arytenoid to the upper margin of the tracheotomy. A string is fastened to the rubber

tube, which is wrapped clockwise about the stem of the tracheal canula, and then fastened to the patient's neck with adhesive plaster. This is to prevent the tube gliding past the tracheal canula.

Another string is allowed to protrude from the patient's mouth to serve as an extractor when the tube is to be changed. This method permits a certain amount of pneumatic pressure because of the air in the tubing.

The second method is the insertion of a single rubber tube from below. The third is intubating by traction.

In the latter two small holes are bored in the lower end of an intubation tube, one in its anterior and the other in the posterior surface of the tube. A stout silk cord is then passed through both these openings, while the head of the intubation tube is threaded in the usual manner.

Removing the tracheal canula, a cord is introduced through the tracheal opening until it presents into the mouth. This string is fastened to that attached to the lower end of the intubation tube. Traction is made with a guiding finger in the larynx, the intubation tube drawn down in position.

The diameter of these intubation tubes may be increased by stretching rubber over the tubes.

Finally, clamped Rogers intubation tubes may be employed.

DISCUSSION ON SYMPOSIUM.

DR. EMIL MAYER, New York City: While I have not tried the method Dr. Lynch described, it appeals to me in every way. Whereas in our old method we have hung up the patient and practically held the weight of his body on the teeth and the tip of the epiglottis, today that patient can, thanks to this method, rest on his back. Instead of hanging the patient up, we are really only opening his jaws. We are getting much closer to his larynx, and are able to go in farther. I have only words of praise to say of the method. I can understand that with the mouth wide open you are nearer and can see better to handle the patient with the fewest number of assistants.

I was particularly interested in the paper of Dr. Iglauer, as I had reported at the meeting yesterday the case of a boy who had worn an intubation tube for five years before I was

able to do away with it. I want again to call attention to the fact of the extreme tolerance of the larynx to manipulations of various sorts. I rather feel that I should disagree with Dr. Iglaue in regard to doing a dissection and making an open wound in the larynx, if you can divulse it in any other way. I have always been able, after a comparatively short time, to have the opening wide enough in the cases that I have seen, to put in the ordinary uterine dilator, either from above or from below, and preferably the latter, and dilate the parts without making any wound.

Again I should object to the leaving of any cord in the patient's mouth and fastening it to the cheek. Those who lived in the early days of intubation thought that they could help O'Dwyer by leaving the cord fastened to the intubation tube in the mouth, but the cord was either bitten through or pulled out by the child, and the attempt was abandoned. My experience is that a piece of rubber tubing fastened at the upper and lower ends acts as a balloon and can be introduced in the manner described, which is quite the manner that I use.

One other thing: I prefer to keep the rubber tube in situ, leaving a double end of cord and tying it around the neck, rather than fastening it to the tracheotomy tube.

The ingenious method of holding an intubation tube in position by drawing it down is one that I think is extremely valuable. The speaker described a method of slow intubation successfully used. During the Spanish-American war he was asked to look after a soldier who had been in the battle of El Caney. Lying on his face, he had been shot by a sharpshooter who was in a tree. When picked up the injured man was bleeding from the mouth, a piece of tissue was hanging from the mouth, and there was an abrasion over the eye. The diagnosis made at the field hospital was that it was a glancing shot and that the eye was not injured. He was put on the transport and sent to Bellevue Hospital, where a tracheotomy was performed. He was walking around wearing a tube, and some ladies asked Dr. Asch and myself to see what could be done. As soon as I looked into the throat I saw a hole punched in the soft palate, as though I had put in a punch and taken out a piece. I learned that the man had been shot from

above, the bullet going down through the maxillary bone, cutting the soft palate, smashing the thyroid cartilage, entering the esophagus, and passing out into the stomach spent, and finally passing per rectum.

I began slow dilatation, and finally got the larynx dilated so much that I thought I could introduce an intubation tube, but as soon as I put it in, the man got blue. I had an intubation tube made of the same external size, but with a larger opening and with an introducer that was hollow, so that the minute it got in, the man breathed through the handle, and I could intubate him for any length of time. In that slow way I could get the intubation tube into the larynx. I mention this method because some such things might arise in this present war.

DR. HUBERT ARROWSMITH, Brooklyn: I cannot see how, referring to Dr. Jackson's method, in view of the fact of the little harm that was done in the old days by copious insufflations of powder into the air passages, a little bismuth could do lasting harm, and I should think that this method would be of extreme value in helping us out in these very uncertain and difficult to locate small foreign bodies. Since I heard Dr. Lynch speak of this in New York last fall, I have used this method continuously, and I can corroborate his statement concerning the greater facility with which the speculum is introduced, the infinitely greater comfort with which it is retained by the patient and the improvement of the operative field.

DR. JOSEPH C. BECK, Chicago: I had a case of a man who had a lung full of coal. He showed a beautiful bronchial tree, and I made experiments with forced inhalation by means of the Billings inhaler of anilin dyes that are radiographically obstructive. This picture, which I am sorry to say I did not bring, showed that if not the insufflation, perhaps the forcible inspiration of radioobstructive substances that would be vaporized might be of some value.

Some of you may remember at the American Congress of Surgeons, that I was going to demonstrate suspension laryngoscopy in a patient under general anesthesia, and was unable to put his head over the edge of the table. Finally I succeeded, with the patient's head flat on the table, and thought that

made a bad job of the demonstration of suspension as then taught. The next day I asked this patient to bend his head back, and he said, "I never could; I have a stiff neck." I have employed this method, as demonstrated by Lynch, for a year. Three weeks ago I had a patient with a little growth in the larynx, of which I could not obtain a good view with the head on the table, but I succeeded very nicely with the old method, so perhaps there are some cases that would still be better handled with the old method. I do not know what was the reason—perhaps some anomalous condition about the hyoid bone.

The method that Dr. Iglauder spoke of, of using the full length intubation tube, I have used with satisfaction, and the new method that he has described today I will employ. I had a similar accident to the one he spoke of, in using the full length intubation tube. It did not perforate, but engaged in the wall of the trachea, and I had considerable difficulty in manipulating it. This method that he describes today will do away with some of these difficulties.

DR. HENRY L. LYNCH, New York City: Dr. Jackson has given us a great aid in bronchoscopic localization by his bismuth insufflation method, especially in difficult localization of small foreign bodies which do not show in the X-ray plate. I have used the bismuth esophageal capsule in many cases which did not show in the X-ray, and by this aid have been able to locate the foreign bodies and remove them.

As far as bismuth irritating the bronchi is concerned, there seems to be little discomfort about it. We have had two cases with tracheoesophageal fistula who complained of difficulty in swallowing. The diagnosis of tracheoesophageal fistula was made from the radiograph. After swallowing the bismuth meal there was a violent attack of coughing, and when the X-ray pictures were taken they showed the whole of the tracheobronchial tree in bismuth shadow. All of the bismuth was subsequently coughed out. After having had this rather unpleasant experience, neither of the patients returned to the hospital for further treatment.

I should like to ask Dr. Lynch whether he removes the apparatus after he passes the bronchoscope, especially when he has to rotate the head in examining the upper lobe bronchi.

The improved Lynch position of the semiflexion of the head in the examination of the larynx is very advantageous, but there is no advantage of suspension bronchoscopy over the other methods which are much simpler in technic.

Dr. Iglauer has brought forward in his paper one of the most difficult problems which we have in surgery. It does not matter how you cure a case of laryngeal stenosis, as long as you get the case well. That is all we are striving for. The voice, in the final outcome, has been far better in the cases cured by intubational dilatation than in those cured by laryngostomy. But when there has been extensive sloughing of the thyroid and cricoid cartilages and complete stenosis, laryngostomy is the only method indicated. You cannot get the larynx dilated from below or from above, and the method of Rogers to dilate the stenosed larynx by means of urethral sounds from the tracheal fistula upward will dilate the larynx, but considerable force is necessary and often an esophageal false passage is the result. If you attempt to forcibly dilate from above downward you invariably have a false passage as a result, and the case may succumb from mediastinal infection. Laryngostomy is by far the safest and best method of curing this type of case. As far as the string is concerned, I agree with Dr. Mayer that it is a very bothersome thing to leave in the mouth and may also be a source of danger, for the child can easily remove the tube by constantly tugging at the string with the tongue. This is, however, impossible with the anchored tubes of Dr. Iglauer.

In cases who have recovered from acute laryngeal diphtheria the tube has often been detubated by the tongue of the child and may be in the esophagus and is noticed only at the time the nurse finds that the child has difficulty in swallowing, while the child has been breathing quite naturally during this time and the tube thought to be in place. If the string must be left on the tube, it is far better to bring it out by means of a small catheter through the nares and attach it to the side of the face. This causes no discomfort, and the child cannot remove the tube with the tongue.

DR. FIELDING O. LEWIS, Philadelphia: I was especially interested in Dr. Iglauer's paper, and it has been my pleasure during the last year to have four of these cases operated on

by the method of Dr. Jackson. I have some drawings which show three of these cases before and after operation, and wish to present Dr. Jackson's laryngoscopy tube with the rubber extension which I have used in all these cases, the advantage of which is that it prevents the formation of a tracheal spur between the tracheotomy tube and the extension, whatever it may be, above. It also permits breathing through the tube, the upper part not being completely closed.

DR. JOHN W. MURPHY, Cincinnati: Before Dr. Iglauer devised this method, as we usually worked together, we had a good deal of difficulty in getting these cases so that they could leave the hospital. They were with us for months at a time. In several of these cases, and the one which he mentioned, too, there was absolutely no opening from the upper part owing to the patient's having worn a tracheotomy tube until the upper part of the larynx had closed, so that even a filliform bougie could not be passed. By means of a fine sound, however, we succeeded in getting a minute opening through this membrane. It is not safe to attempt to enlarge the opening with any instrument. We find that the moment we can get the finest probe through and carry a string down and draw the tube up, we take much less risk of doing damage, and by this continuous method of dilatation we get much more satisfactory results than by any other.

The method of Dr. Lynch has been employed sometimes by me since I saw him use it, about a year ago. I find it simpler and very much more comfortable to the patient.

DR. GEORGE F. COTT, Buffalo: I had the same experience as Dr. Beck. In my case the patient had difficulty in breathing. I put him under ether and tried to introduce the bronchoscope and found that I could not put the head back far enough. The next day he told me that he had ankylosis of the vertebræ of the neck. That is a thing that does occur now and then.

DR. WOLF FREUDENTHAL, New York City: It seems to me that the method of Dr. Lynch is a great improvement over the old one, yet I am not ready to give up the original Killian method with the head hanging down, for a certain class of cases. I operated with suspension laryngoscopy in a tuberculous case in which any effort on the part of the patient was not desirable on account of hemorrhage. For this class of

cases the new modification is really excellent, but we encounter cases in tuberculous patients which do not go as you want.

DR. ROBERT C. LYNCH, New Orleans: I want to correct a wrong impression on the part of Dr. Cott. Cases of the acute type would get well sometimes, and when the child was recovering from the stenosis lesion the tube could be easily coughed up without anyone knowing of it. We recently had admitted to the hospital a child that had had a tube put in by a specialist. The child was then sent to the hospital, and when he got there the tube was stuck to the side of the mouth. He was cyanotic. One of the house staff pulled the string and found the tube was probably in the stomach. The child can cough the tube out when the stenosis is subsiding without there being any evidence of it.

DR. HARMON SMITH, New York City: A few years ago Dr. Lynch reported no recurrences after removing papilloma, and I thought that he had solved this problem. It would be interesting to know whether the growths were single or multiple, and whether single or multiple in children or in adults, because I think that the class of growth materially affects the problem of recurrence. In the multiple variety in children the more they are interfered with the more they recur, and even after all methods have been tried the tracheotomy tube for a long length of time is, I think, one of the safest modes. Secondly, the removal of a growth in an adult and its non-recurrence does not assure us that after removing a papilloma in another adult it will not recur. Papillomata vary in type, in malignancy and in tendency to recur, and from the pathologic standpoint you are unable to deduct whether or not the tumor will recur. Another point that I should like to have brought out by Dr. Lynch, is whether he has ever employed fulguration alone, because, with the suspension, as he employs it, the surface of the larynx can be made as dry as the face, and I have always contended that if you can dry the surface of the papilloma in the larynx and can be sure that it will remain dry during the fulguration, the fulguration will overcome it—except in the multiple variety in children.

CLOSING DISCUSSION ON SYMPOSIUM.

DR. CHEVALIER JACKSON, Philadelphia: So far I have used the method presented only in cases in which it promised ben-

efit to the patient, directly or indirectly, for localization or therapeutic effect. It remains to be determined whether or not we may expect benefit to chronic bronchitis, pulmonary abscess and other lesions. I used dry powder, and it was coughed out completely in twenty-four hours. Possibly other preparations might not be so readily gotten rid of. I hope Dr. Arrowsmith will try to devise a way of getting the dry powder or some suitable preparation down through the larynx without having to pass the bronchoscope. The method then would be of general application by the roentgenologist. Localization, individual variation, bronchiectasis, abscess and other pathology could be readily demonstrated.

The treatment of obstinate tracheal stenosis has been a hobby with me for many years. The method developed by Dr. Ellen J. Patterson and me gets the patients well. Our experience coincides precisely with that of Dr. Lynah as to the indications for laryngostomy. Our experience also coincides with that of Dr. Mayer and Dr. Iglauer in regard to the use of another method when one method does not succeed. In laryngostomy the operation is of less importance than the after care. Too many cases are reported too soon. Dr. Patterson insists on a period from one to three years before doing the plastic operation for closure of the laryngostomic opening. One of our patients who lives in Chicago was recently sent to Dr. Beck for plastic closure, and I think he can testify to the widely open larynx obtained by the method devised by Dr. Patterson and me.

DR. ROBERT C. LYNCH, New Orleans: In response to the question of Dr. Lynah as to whether we removed the suspension in bronchoscopy, especially in work on the upper bronchi, I would say that it is preferable in these cases to do the bronchoscopy without suspension, the apparatus being used for the simple passage through the vocal cords. When it has entered the trachea, the suspension has served its purpose, and the rest is better done without the suspension apparatus being in situ. The only exception is where there are multiple foreign bodies, when it is necessary to introduce the tube several times, and retention of the apparatus will save the traumatism induced by passing the apparatus through the larynx of an infant or young child.

Replying to Dr. Smith, all of these cases were put in this appendix on the recurrence of papilloma after dissection purposely to contradict my statement made at first, when I reported sixteen cases of papilloma of the larynx removed by the dissection method without recurrence. I had had no experience with recurrence up to then, but since then the cases have increased, and my knowledge in proportion, and we have had these five recurrences after dissection by means of suspension. I reported that particularly to contradict my own statement that there were no cases of recurrence.

The cases were all multiple. They were all in children, and I brought out the point that they recurred after some inflammatory attack in three instances, and without reason in two. I have used fulguration, and believed that in the multiple cases possibly it is better than dissection. Recently I have been drying the papilloma by swabbing the surface first with alcohol and blowing in compressed air to dry out the water that is in the papilloma and then fulgurated it.

DR. SAMUEL IGLAUER, Cincinnati: As a matter of fact, I do not always leave the string in the mouth, but I find that it takes a little time and trouble to depress the tongue and find the tube by the ocular method. The question is, How sharp are the teeth? We have one little fellow who has very sharp teeth, and he usually chews through the string. As far as the tube's being coughed up and getting into the esophagus is concerned, that is impossible in this method, because the tube is anchored below. I find that by leaving the string in the mouth it is easy to make the change when I want to put in a fresh tube. I think that we should devise all methods we can to facilitate treatment, because no matter what method is used, the chief things are persistence and patience. If you can save the time in your daily work, it counts, both for yourself and the patient.

So far as I know, there has been no spur formation. When one uses the intubation tube, one can work the rubber covering downward on the posterior lip of the tube, and that prevents the formation of a spur.

As for laryngostomy, there is no objection to it in special cases, but if one can treat a case without splitting the larynx one is better off.

The Activities of the Subcommittee of Otolaryngology, Section of Surgery of the Head, Surgeon General's Office.

CHARLES W. RICHARDSON, M. D., CHAIRMAN.

This committee, consisting of Dr. Richardson, Dr. Shurly and Dr. Mosher, presented to the Surgeon General the resolution of the societies they represented as to the need of establishing a division of the Medical Corps of the Army and Navy, to assume charge of injuries of the head and air passages and the diseases of the eye, ear, nose and throat, acquired in service, in addition to making special examinations of aviators and the employment of hospitals and their staffs for this purpose.

The Surgeon General of the Army promptly appointed Major T. C. Lyster as an adviser to the committee, and the Surgeon General of the Navy appointed Surgeon G. E. Tribble, and these two, together with the original committee, were subsequently appointed by the General Medical Board of the Council of National Defense as a subcommittee on the nose, throat and ear, of the Surgical Specialties.

This committee listed five thousand six hundred names of otolaryngologists, adopting the questionnaire already prepared by the Subcommittee on Ophthalmology. The lists were indexed by volunteer typists, the questionnaires addressed and mailed, and the replies disposed of, and a competent stenographer appointed.

Advisers in each State were appointed to cooperate with the committee as to the standing of individuals and their classification. All information was thus thoroughly catalogued.

Of 5,468 questionnaires sent, 2,014 replied, while 3,474 failed to answer.

The Subcommittee on Ophthalmology was combined with that of Otolaryngology for such purposes only as might be required, each still retaining its individual identity.

A request was made to the General Medical Board of the Council of National Defense that the Subsections of Laryngology and Otolaryngology and the Subsection of Ophthalmology should meet in joint session.

A request was made also for the addition of a Brain Surgeon to the Ophthalmologic Section, and an Oral and Plastic

Surgeon to the Otolaryngologic Section, thus completing the Division of Surgery of the Head. This request was also promptly approved by the Surgeon General of the Army.

Dr. William H. Wilmer was made chairman of the joint Section of Surgery of the Head. Dr. V. P. Blair and Dr. Bagley were made members of the subcommittees.

The Subcommittee on Otolaryngology was formally approved by the Council of National Defense on August 15, 1917.

The following activities for otolaryngologists have been established:

Suggestions for a one thousand bed hospital for the Surgical Head Section on the Western front abroad were presented to the Surgeon General and approved. The members of the subsection visited various large cities and addressed otolaryngologists to arouse their enthusiasm and gain recruits to the Army Medical Service; otolaryngologic instruments standardized; requirements for entrance into the Army as to hearing revised; tests for malingerers assembled; tests made to ascertain the value of ear protectors; plans for a special hospital and dispensary building in cantonments for the Section on Surgery of the Head; the activities of the subcommittee outlined and sent to the members of the national societies; the appropriate grade of the assignment of the various candidates in the Medical Reserve Corps was indicated by the members of the committee in the office of the Surgeon General; an accurate tab on the professional qualifications and character of each candidate for service was had; the assignments in otolaryngology at base hospitals and cantonments; a roster of men to be assigned in otolaryngology in base hospitals abroad (in preparation); a course of lectures at the cantonments by the Chiefs of the Otolaryngologic Staff ordered, the officer designated to deliver the lectures, subjects given for the lectures, and a list of the books for the library prepared.

Major H. W. Loeb of St. Louis was assigned to the office of the Surgeon General to prepare a War Manual of Otolaryngology.

Major B. R. Shurly resigned, and Major J. H. Bryan was

nominated by the Council of the American Laryngological Association to the vacancy. This was approved.

Major Mosher was ordered abroad on an inspection tour with Lieut.-Col. Lyster, and Major Richardson to temporary duty in the Surgeon General's office.

Exhibits are presented indicating the various subdivisions of the Surgical Service approved by the Surgeon General. Finally, Col. Richardson presented a report on the proposed reconstruction of the defects on hearing and speech as a result of casualties in war.

This exhaustive and comprehensive report is accompanied by exhibits in detail.

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LXI.

MULTIPLE OSTEOMA OF THE NASAL ACCESSORY
SINUSES; REPORT OF A CASE COMPLICATED
BY SYPHILIS; OPERATION; AUTOPSY.

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Although osteoma of the nasal accessory sinuses is comparatively rare, there is a considerable literature of the subject, which is, however, largely French and German. The English have reported a number of cases, but, as far as the present writer knows, have made no comprehensive study of the subject; the Americans also show this same lack of exhaustive treatment; Andrews¹ article (1887) on orbital osteoma and one by Guntzer² on nasal osteoma are the only ones that treat the subject extensively. There are also shorter articles by Knapp,^{3,4} Fridenberg,⁵ Van Wagenen,⁶ Chapman,⁷ and Barnhill,⁸ and a few other case reports.^{9,18}

The rareness of bony growth, of the orbit at least, may be judged from the fact that Andrews reported only eight cases of orbital exostosis out of almost 430,000 cases of eye disease, or 1 in 53,700; Adamük¹⁹ makes a similar statement. In

1881, Bornhaupt²⁰ reported 49 cases of osteoma, of which 23 were of the frontal sinus, 11 of the ethmoid labyrinth, 10 of the antrum of Highmore, and 5 of the ethmoid and sphenoid sinuses. Hermann Knapp³ in the same year reported 11 cases of osteoma of the frontal sinus, of which he stated that his own was the only American case on record. Haas²¹ in 1901 collected 63 cases, 21 of which were nasal. Gerber²², in 1907, reported 87 true cases of osteoma of the frontal sinus. Taranto²³ (Paris Thesis, 1901) gave 129 cases of osteoma of the nasal accessory cavities collected from the entire range of medical literature, and, up to 1914, Boenninghaus²⁴ had added 74 new cases to these 129, making a total of 203.* Since that time, about a dozen other cases have been reported, so that today we have a rough total of 215, representing all the cases in the medical literature from 1748 to the present time.

Osteomata are on record as occurring from the fourth to the seventy-fourth year. Over 50 per cent are noticed during adolescence, and about 30 per cent more before the thirtieth year of life. These growths are of three varieties, the hard or eburnated, the compact, and the spongy. Their dimensions, roughly speaking, range from that of a bean to that of a good-sized potato. They are reported as weighing from 7 to 440 gm. This latter is Hilton's²⁵ case of 14¼ ounces, an osteoma† of the sphenoid and orbit, apparently the largest human case on record. In comparison we might mention an ivory exostosis of over 16 pounds weight, from the forehead of an ox, on exhibition in the Museum of the College of Surgeons, London.²⁶ The extreme hardness attained by eburnated osteoma may be judged by the fact that in four cases that came to operation the difficulty of making any impression on the ivory-like growth with chisel, saw, or trephine was so great that in each case the operation had to be abandoned.²⁷ Grossman²⁸ removed one orbital exostosis by cross-drilling with a dentist's burr.

*These figures are cited from Chapman's report of Boenninghaus' article, second edition, 1914, as only the first edition was available to the writer. In this edition it is stated that the cases had been collected from the literature up to 1910; they numbered 198, not 148, as misprinted in Pfeiffer's article.

†Hilton's case is usually considered as an osteoma; Gerber, however, seems inclined to class it as an exostosis.

Osteomata are generally of slow growth, the development frequently covering a period of ten years and sometimes much longer before the annoyance has caused the patient to seek relief. Although these tumors are histologically benign, they are clinically malignant, since if left alone they exert pressure into the cavities of the orbit and the cranium. The only treatment is complete removal. In Boenninghaus' collection the mortality of the cases operated before 1885 was 16 per cent, and for those operated since that time, 3 per cent. According to Pfeiffer,²⁹ in the preantiseptic era the mortality was very high, but with the introduction of asepsis, improved operative technic, and recognition of the fact that an osteoma is an encapsulated tumor, the mortality has greatly decreased. Hermann Knapp³ stated that the safety and success of operations of osteoma, not only of the frontal sinus but of all the cavities of the head, lay in shelling out the tumor from within its capsule. According to him,⁴ the real element of danger occurs when there is a long prepared diseased condition of the tissues surrounding the tumor. Where this exists, the operation may be the inciting cause of meningitis or encephalitis. As chiseling through healthy bone is not dangerous, the osseous tumors which develop in comparatively healthy pneumatic cavities can be removed with safety. As a matter of fact, when death occurs it is usually from intracranial complications—meningitis or brain abscess—and generally in cases where projections of the tumor reach into the cranium. With early operation the prognosis is favorable.

Classification.—According to Gerber, the nomenclature of bone tumors in the older literature was often obscure, and a tendency existed (a) to make no distinction between exostoses (frontal bone and orbit) and true osteomata of the sinuses; and (b) to group together all the osteomata of the ethmoid and frontal region. Gerber has classed as exostoses the cases of Lucas, Keate, Cooper (and questioned those of Hilton and Hoppe), which are elsewhere regarded as osteomata. It is also interesting that in his attempt to obtain a correct classification of osteomata in imperfectly reported cases, Gerber located the growth according to the dislocation of the ocular globe; when the protrusion of the eye is forwards only, he classifies the osteoma as sphenoidal or orbital; when the pro-

trusion is exclusively outwards, tumor of the ethmoid is inferred; where the globe is directed upwards, the maxillary sinus is involved; while a propulsion forwards, outwards, and downwards is pathognomonic for tumors of the frontal sinus. Knapp states that the onward march of an osteoma growing in the frontal sinus must push the globe in these three directions. The X-ray is today our best means of information as to the form, location and size of the tumor.

Growth and Origin.—Osteomata may involve one sinus or cavity only, or they may develop symmetrically, involving corresponding sinuses. They may be multiple distinctive growths with apparently different foci, or they may send out projections from a single point of origin. This point of origin may be the frontal, lacrimal, or nasal bones, the nasal process of the superior maxilla, the turbinates, etc. Of Bornhaupt's 49 cases, 34 originated in the ethmoid. Gerber gives the proportion of tumors arising in the ethmoid as 12 to 8 to those arising in the frontal sinus. According to Güntzer, "in most instances the point of origin is difficult to demonstrate, the weak connection with the nasal skeleton is so easily destroyed in operative manipulation, or, by pressure, atrophy or pus formation, the pedicle may be destroyed and the osteoma become sessile or entirely free."

Histopathic Origin.—Osteomata have been variously described as originating from the diploe of the frontal bone (Virchow³⁰), as ossifications of the Schneiderian membrane lining the nasal cavities (Dolbeau³¹), as of periosteal origin (Sappey, see Dolbeau), as enchondroma (Rokitansky³²), or remnants of fetal cartilage which later ossify—Arnold³³, and Tillmans³⁴ have elaborate theories to this effect—as originating from connective tissue rudiments (Pfeiffer), as ossifications of mucous polypi (Cloquet), as developments of the small exostoses, osteophytes, or hyperostoses of the frontal sinuses (Gerber). Cruveilhier³⁵, 1856, believed that they develop in the interior of the bone in such a manner as to push the peripheral layer of bone before them like a capsule. The question is still open.

Sinuitis as a Complication.—Before discussing the theories of causation of osteoma of the nasal accessory cavities, it would perhaps be well to consider the complications frequent-

ly accompanying these tumors. The proportion of osteoma with and without complication is not known. Hücklenbroich³⁶ in 1905 found six out of sixteen (37.5 per cent) of the more recent cases complicated by sinusitis. These are the cases of Mitvalsky,³⁷ Coppez³⁸ (two cases), Tauber,³⁹ Zimmermann,⁴⁰ and Witzheller.⁴¹ The present writer has also noted eight others, including his own, Knapp,⁴²⁻⁴ Satteler,¹² Pfeiffer, Gerber, Van Wagenen, and Chapman. Mitvalsky (p. 613) states that the granulations and the polyps of the mucous of the frontal sinus as auxiliaries of osteoma of the nasal accessory cavities have long been known; and that Virchow, who rejected Cloquet's idea that the osteoma developed through the ossification of these polyps, neglected the question whether (a) the affection of the frontal sinus precedes the osteoma and is the determining cause of its evolution, or (b) whether the affection of the sinus is merely the result of the presence of the growth in course of evolution. Coppez considers that the permeability of the nasofrontal canal has to do with the presence or not of sinusitis. When the canal is closed, the products of mucosecretion have no means of evacuation; they stagnate in the depths of the sinus, ferment and decompose there, with inflammation and suppuration of the sinuses as inevitable consequences. He assumes that the presence of the osteoma is responsible for an edematous mucosa which forms folds and obstructs the opening of the canal, together with the progressively growing osteoma.

The view that complications in the frontal sinus occurring with osteoma were inevitably direct results of the obstructing growth has been generally accepted. Gerber is apparently the first writer to consider that a sinusitis might antedate the growth of an osteoma and be a causal factor in its development. According to him, latent torpid sinusitis producing inflammatory irritations is comparatively frequent in the frontal sinuses. The irritations thus produced, which are capable of causing ossifications of bone or periosteum, exert their maximum influence during the period of formation of bone and development of the frontal sinuses, thus explaining the youthful age of the majority of the cases. Gerber states (1907) that up to recent times there has reigned a false conception of the inflammatory modifications of the frontal sin-

uses, which are often due to conditions left by the many violent inflammations of the nasal fossæ. Although these inflammations of the sinuses generally disappear without leaving any traces, they may, however, persist and become true empyemas with more or less involvement of the bony walls of the sinus in the morbid process. The frontal bone itself has been affected by such lesions far more often than is generally credited. Furthermore, it is well known that such symptoms may survive in individuals enjoying excellent health.

The case reported by Chapman of frontal osteoma in a woman of fifty-two years, who had suffered from headaches for three years following gripe, seems to be illustrative of Gerber's argument. Doubtless, in this case, the inflammatory condition left by gripe either caused an osteomatous growth to develop or else speedily accelerated a latent growth of such small size that it had given no indications of its presence up to the age of fifty-two years. In one of his cases, Hermann Knapp⁴ wrote that a chronic inflammation in the pneumatic cavities of the upper part of the face had led to a distension of the left frontal sinus and rendered its osseous wall congested and porous (ostitis), with beginning necrosis. Finally, the youthful age at which sinuitis usually develops should be kept in mind.

Symptoms Accompanying Osteoma.—A considerable number of cases of osteoma are reported as being absolutely without symptoms except a greater or less displacement of the eye or facial disfigurement. Curiously, this lack of symptoms seems to be independent of the size of the tumor; large growths have been removed where the cosmetic effect was the patient's only interest. There is, however, a whole range of symptoms which frequently accompany osteoma of the nasal accessory cavities; they include nasal obstruction, catarrh, anosmia, difficult respiration, otorrhea, middle ear deafness, etc., and are regarded almost exclusively as pressure symptoms due to the increasing injury of the surrounding parts by the morbid growth. However, there are certain cases with a long history of illnesses, where the probability that an inflammation of the mucous membrane antedated the osteomatous growth is very strong; such cases make one wonder

if an original infection of the tissues lining the nasal cavities was not a causal factor in the production of the osteoma, which in turn added pressure and obstruction to the original trouble.

Osteoma in Cases of Constitutional Maladies.—(On this subject the literature gives very little information; a lack of adequate examination of the patient renders many reports unsatisfactory. A few interesting cases are, however, reported: Van Wagenen had a case of frontal osteoma in a patient who previously had suffered from frambesia, a tropical disease caused by a spirillum similar to that of syphilis; he regarded the osteoma as secondary to the infection. Leonte⁴³ gave an etiology of secondary syphilis in a case of nasal osteoma in a man of fifty-four years who had contracted syphilis at twenty-six, followed by secondary syphilis, with much coryza and articular rheumatism at forty. There was no other cause. Gerber also reports an etiology of syphilis in one of his cases of frontal osteoma. Dolbeau reported a case of frontal osteoma in a man of twenty-one years, with a long history of illnesses including typhoid and blennorrhea. There are other similar reports. Many of the former writers have stated that there was no question of syphilis in their cases, but we might pertinently ask, "How did they know?" The fact that antisyphilitic treatment did not decrease the osteomatous growth is no proof of the absence of specific disease.

Etiology.—The writer has just considered briefly certain conditions possibly contributing to the development of osteoma before reviewing still more briefly the many and confusing hypotheses furnished by the literature. Historically, there are three general theories: (a) The first and oldest theory, that of trauma as a primary cause, is obviously the result of the fact that a number of the earlier cases were complicated by external injuries—falls or blows. At the present time traumatism is generally regarded as a contributory rather than an essential cause, since many cases have been observed where there had been no trauma, and also because of the nature of the growth, which may be symmetrical or multiple. However, a number of fairly late writers, Dubar,⁴⁴ Taranto, and Miodowski,⁴⁵ still are inclined to believe that osteomatous growths can be traced to external

traumatism. (b) The second and most widely held theory is that of an embryonic genesis—an anomaly of growth, a congenital fault—which, as previously stated, various writers have located in bone, periosteum, fetal remnants, etc. Given certain circumstances—a perfectly healthy individual, without constitutional disease, without sinusitis or lesions of the nasal fossæ, with no history of traumatism: at a youthful age, particularly at adolescence, when the growth in the frontal region is greatly accelerated—and this theory affords a satisfactory explanation of the development of osteoma. Under such circumstances, Citelli⁴⁶ attributes these growths to an ontogenetic or morphologic lack of balance in the rapidly growing osseous elements, aided by a more or less congenital predisposition. (c) The third theory is Gerber's intermediary theory, according to which a mechanical cause—external traumatism—or an inflammatory process, sinusitis or lesions of the mucous membrane of the nasal accessory cavities—may provoke or stimulate otherwise quiescent inherent faults of development to active growth.

In conclusion, the writer summarizes his own beliefs on this subject of etiology as follows:

(a) In cases of osteoma of the nasal accessory cavities there is in all probability an original fault or tendency, congenital in the individual.*

(b) Such faults or tendencies, when not irritated to activity, often probably remain quiescent and never develop.

(c) Conditions likely to activate osteomatous growths are:

1. The great neoformative activity in the frontal regions during adolescence.
2. External traumatism.
3. Endogenous irritations: inflammations and infections of

*There is a possibility that abnormalities of bony growth—osteoma, exostosis—occur in a certain type of person; one possibly in whom the organs of internal secretion, pituitary, thyroid, adrenals, cannot maintain a proper balance. The writer was interested to note in his two cases of osteoma—the one reported here and another under observation not yet operated upon—that one, a man of forty-three years, of great physical vitality, had the mentality almost of a child, while the other, a girl of eleven years (referred to me through the courtesy of Dr. Martin Cohen), had the physical development of a mature woman.

the nasal accessory cavities—i. e., the sequelæ of grippe, influenza, and the whole range of nasopharyngeal affections. These conditions are probably the most frequent cause of trouble.

4. Constitutional maladies, particularly syphilis, and possibly other infectious diseases.

5. Above all, combinations of these different causes; of the effect of such combination, the literature furnishes many examples.

REPORT OF A CASE.

In July, 1917, Dr. C. W. Cutler referred a case to me, in which a hard mass growing outwards, forwards, and downwards, apparently from the junction of the frontal and ethmoid, had produced a marked displacement of the right eye and partial closure of the lumen of the right nostril. Dr. Cutler's report read: Right eye separated 41 mm. from median line; left eye, 32 mm. Right eye displaced $3\frac{1}{2}$ mm. outwards, $3\frac{3}{4}$ mm. downwards. Moderate exophthalmos, no diplopia, motility apparently normal. Vision in right eye, 20/20; in left, 20/15. A tentative diagnosis of osteoma of the right orbit was made. The first X-ray plates showed a mass involving both frontal sinuses and the ethmoid, and protruding into the right orbit, with dislocation of the right middle turbinate toward the median line and consequent partial occlusion of the right nasal cavity.

The patient, an Italian, a chauffeur, aged forty-three years, stated that for the past seven years he had noticed a hard mass growing in the inner angle of the right eye. Other than this growth, he was enjoying the most robust health, and was a man of extraordinary vigor and muscular strength, with no history of illnesses. Nevertheless, a Wassermann taken as a matter of routine at the time of examination showed 4 plus. Consequently, several injections of oxycyanate of mercury were given, not with the hope of reducing the growth, but of assisting the healing of the tissues after operation. The only treatment for the osteoma was surgical.

First Operation, July 25, 1917 (Dr. C. W. Cutler present).—Procedure: Killian incision on right side; elevation of scalp; entrance into frontal. The outer table was partly ab-

sorbed and quite thin: immediately underlying it was an enormous, irregularly shaped, eburnated osteoma, which because of its extensive size was more or less flattened from before backwards. It filled the unusually deep right frontal sinus anteroposteriorly and extended for a considerable distance into the left, with complete destruction of the septum. The patient's frontals were enormous, and that part of the tumor lying in them alone was larger than the average frontal sinuses.

In order to approach the growth from above, a transverse incision directed outwards and upwards from the original incision was made above the left eyebrow, and the outer table of frontal bone was removed over the left frontal sinus. When the osteoma was entirely uncovered, it was apparent that the growth came from or extended into the ethmoid and also into the right orbit. Consequently it was furthermore apparent that it would be impossible to get it out without removing the inner two-thirds of the right supraorbital ridge, which was accordingly done. When the osteoma was thus uncovered so that its outlines could be clearly seen, we found that we could not enucleate or even rock it, and it was necessary to bite it out piecemeal with large rongeurs, with the expenditure of great force. In removing the tumor from the frontal sinuses, we discovered that it had eroded through the inner table of the skull; and the dura, which was very thin and apparently adherent, was torn in manipulation, allowing the escape of cerebrospinal fluid. The wound was covered with iodine gauze, and the operation proceeded.

Pus was encountered in the recesses of the frontal sinuses beyond the margins of the tumor; of this pus, several cultures were taken, which later proved sterile. When the pus and the granulation tissue were cleaned away, the tumor was bitten down to the top of the orbit, and a portion as large as a grape shelled out of the orbit. The osteoma in the orbit seemed to be a continuation downwards from the solid frontal growth and also to be in close articulation with the osteoma of the ethmoid.

After we had removed this portion of the eburnated tumor, we noticed that the bone at the base of the frontal sinus and at the lower part of the inner table was of unhealthy appear-



Plate I.—Anteroposterior view of osteoma before first operation, showing osteoma in frontals, ethmoid, and encroaching into right orbit.

ance—fibrous or cancellous in character. Although Dr. Güntzer states that in the hard variety of osteoma, the place of attachment is usually soft or cancellous; nevertheless, in this particular case, I regret that I did not have some of this bone examined for spirochetæ.

The first operation was concluded without opening the nose, since, because of the torn dura, there was fear of cerebral infection. The frontal sinus was packed lightly and the wound sewed up, leaving an opening for drainage near the median line at the inner extremity of the supraorbital ridge, as no drainage could be established through the nose. The patient ran the usual postoperative temperature for three days and proceeded to a slow and uneventful recovery. In September, Dr. Cutler stated that the displacement of the eye outward was slightly increased. Vision, 20/30. Later, in December, Dr. Cutler reported vision 20/20; fundus normal; lateral displacement of right eye same as left, namely, 32 mm. Very slight displacement, if any, downwards. Pupils always equal; normal reaction. Occasional complaint of diplopia in distant vision, but not annoying. Return of eye to normal position and function.

During convalescence the patient received various active antispecific treatments—intravenous injections of salvarsan, injections of mercuric salicylate, and oxycyanate, as well as potassium iodid. Later, he received antispecific treatment at Hot Springs, Ark., where, upon his arrival, the Wassermann was said to have been 1 plus, but on his return to New York, three months later, in December, a second Wassermann again showed 4 plus. Further X-rays, including a stereoscopic pair, were taken at the Manhattan Eye, Ear and Throat Hospital, and from these latter it was revealed for the first time that the bony growth extended into the cranial cavity. Realizing that it would be impossible to remove all of the growth, I consulted with various colleagues as to the advisability of further operative procedure. It was decided to be wise and justifiable to remove as much as possible of the growth from the ethmoid and establish free drainage from the frontal into the nose; this decision was strengthened by the amount of pus constantly present.

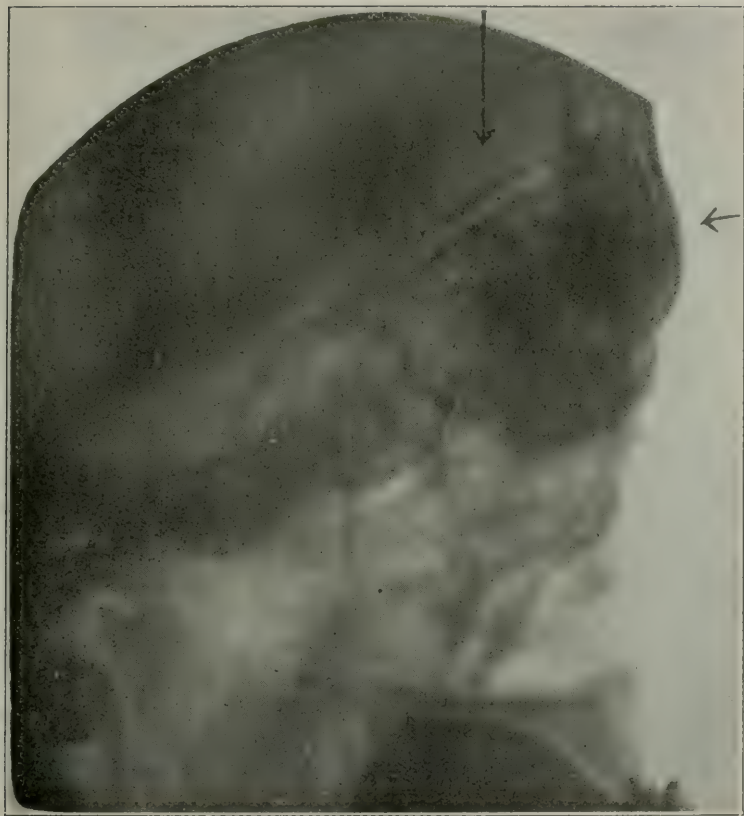


Plate II.—Lateral view before first operation.

Second Operation, January 8, 1918.—Line of old incision reopened and extremities of two former lateral incisions extended. Scalp retracted, frontal sinuses exposed; very thorough cleaning out of pus. The opening into the dura had granulated over and was carefully avoided. With a Killian chisel an opening was made through the lacrimal bone in order to enter the ethmoid, but when the lacrimal bone was removed the hard eburnated tumor presented, and no progress could be made towards the ethmoid. Therefore, the right middle turbinate was removed as a whole intranasally. During this removal two small nuggets of ivory-like bone dropped out of the mucosa of the middle turbinate body. The way was now cleared for entrance into the ethmoid, which was the seat of several medium sized osteomata, which formed a sort of interlocking combination with closely articulating faces. After these were removed there yet remained one more flat, wedge-shaped growth—hard and glistening—on the right side of the ethmoid which, from its solidity and implacement, as well as the X-ray findings, I realized extended into the brain; this piece was left in, for fear of trauma to the cribriform plate and the meninges. Finally, there was cleaned out from the cancellous tissue a little fistula, containing pus, which lay in the median line just above a line connecting the supraorbital ridges. Examined with a probe, the fistula seemed to have a soft, resilient base, which, when the lumen of the fistula was enlarged and the pus cleaned away, proved to be the longitudinal sinus.

As free drainage had been established from the frontal sinus into the nose through the enlarged infundibulum, the wound was sewed up, after a large cigarette drain had been placed through the infundibulum and out through the nose. In addition to this, a cigarette drain was also placed at the outer extremity of each of the frontal sinuses, to take care of the numerous and extensive recesses requiring drainage.

Several stitches of the wound near the inner canthus of the eye unfortunately did not hold, and because of the pus tore through the tissue. Later, this opening was utilized, together with those of the extreme lateral ends of the sinuses, to wash through the frontal sinuses with Dakin's solution, and yet later to instill dichloramin-T.

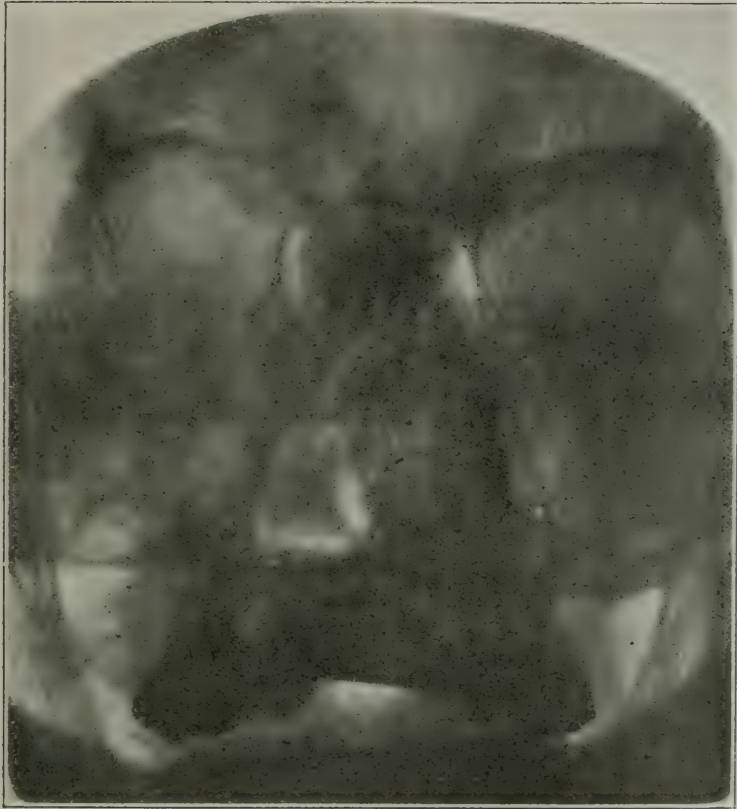


Plate III.—Anteroposterior view after first operation, showing osteoma removed from right orbit and frontals, but still present in ethmoid.

The patient recovered from the operation and was in good condition; he was bright, cheerful, talkative, enjoyed going out to the movies, etc. It was impossible, however, to eliminate entirely the pus discharge from the wound, even by the frequent use of dichloramin-T, with which Dr. E. K. Dunham kindly furnished me, although this did cut it down markedly. On February 21st, for the first time, the patient complained of severe headache which kept him awake at night. Medication gave little or no relief. He became progressively worse and more apathetic. A white cell and differential blood count made at this time showed 21,600 leucocytes, with 78 per cent polynuclears; a later count showed 16,000 leucocytes, with 70 per cent polynuclears.

On the morning of March 2d, while sitting up, he suddenly fell over unconscious, and after this he did not talk again. He could be roused at times, but answered questions only by shaking his head, and at noon of the next day, March 3d, he died.

The autopsy was performed March 4th, at 1 p. m., by Dr. J. G. Dwyer. His report follows: Usual postmortem technic. Skull—Removed; on both sides of vertex, in both parietal bones, there was marked rarefying osteitis which had almost penetrated the skull on both sides. Dura slightly congested, but otherwise normal except in region corresponding to above bony lesions, where marked infiltration of dura took place with formation of granulation tissue.

Brain Examined in Situ.—Marked loss of tissue of both frontal lobes, especially on anterior under surfaces, where large brain abscesses with degeneration of all surrounding tissue occurred. About three ounces of pus evacuated from right lobe and two ounces from left. Cultures taken and proved sterile after six days. General appearance of brain as a whole suggestive of "wet brain."

Bone.—Leading from site of the operations to right side was a marked infiltration of the posterior inferior wall of the frontal sinus with newly formed bony tissue.* This new tissue had formed spicules, some of which had penetrated the dura and the frontal lobe, and led to the brain abscess, which

*At the base of the cancellous tissue.

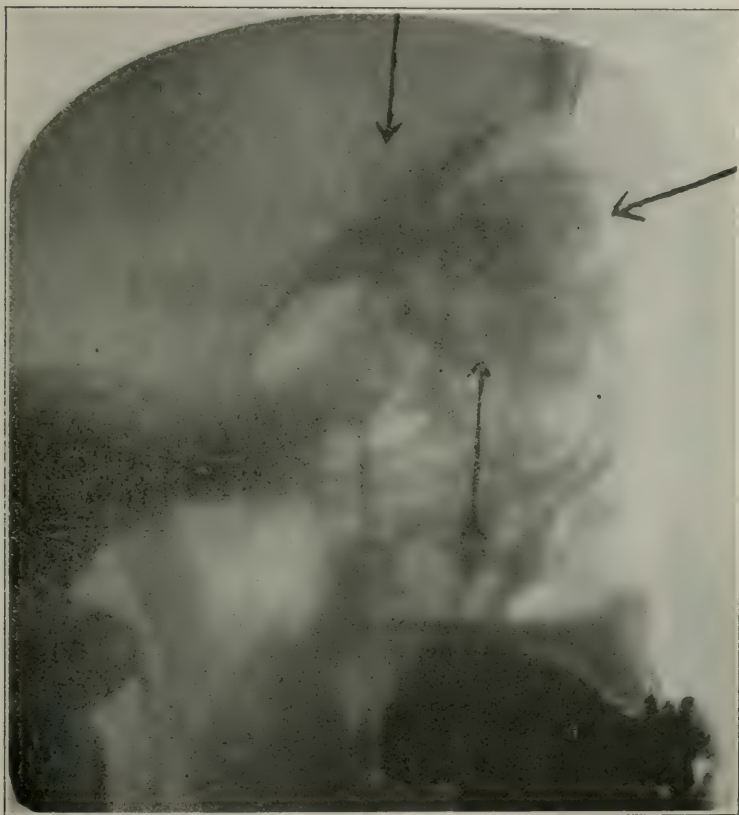


Plate IV.—Lateral view after first operation. Arrow at top indicates upward growth of osteoma into brain.

was probably secondary in character to the bone invasion. A similar but less extensive condition prevailed on the left side. The crista Galli, left superior turbinate, and surrounding bone had been replaced by newly formed hard osteomatous tissue. Antra and other parts of head negative except for obliterating endarteritis. No invasion of orbits per se.

At my special request, Dr. Dwyer had numerous sections of the brain, dura, and portions of the osteomatous bone prepared and examined to see if spirochetæ could be detected. He returned the following histologic report:

Large Mass of Osteoma.—Typical appearance of osteoma, with exception of marked fibrous tissue infiltration within the cortex, separating the osteomatous tissue proper. This is unusual in osteoma of the primary type and leads to the belief that the osteoma may be secondary to or caused by syphilis. Dura over frontal lobes, in contact with rarefied parietal bones, shows a typical syphilitic process with giant cells and marked cellular infiltration. Turbinate bones: The superior on left side markedly hardened, osteomatous in character, shows same infiltrating processes as those of large mass described above. Middle turbinate on right side: process here is less extensive, consisting simply of a round cell infiltration of a small part of the turbinate. (As previously stated, two small osteomatous nuggets dropped out of the mucosa of the right middle turbinate during operation.) Histologically, the osteoma as a whole is multiple, as the different parts affected are not connected with each other. It is a question whether there is a primary osteomatous condition, complicated by syphilis, or an osteomatous condition secondary to syphilis.

SUMMARY.

1. The growth just described was a multiple eburnated osteoma involving the frontals, ethmoid, right orbit, middle and superior turbinates and crista Galli, and protruding into the cranial cavity. The thickness of the cortex, judged from measurements of one or two of the larger pieces removed, varied from 2 to 12 mm. As this osteoma was so large and involved so many sinuses, it was impossible to remove it as a whole, so that no exact size, shape, measurements or weight could be obtained; consequently, the size must be determined

as far as possible by measurements of the shadows in the X-ray plates. In these, Dr. F. M. Law gives the following dimensions: Transverse diameter in the frontal region, 70 mm.; anteroposterior diameter, in the ethmoid region, 40 mm.; in the frontal region, 20 mm. Vertical diameter, 60 mm. A later X-ray gave the measurements from the cribriform plate, downwards and forwards, 45 mm. Within the cranial cavity, above the cribriform plate, the shadow seemed to extent upwards about 20 mm.

2. In the frontal sinuses and the right orbit, this osteoma was one solid, continuous growth; but in the ethmoid region it was composed of several nuggets, some of whose faces articulated so perfectly that, literally speaking, a hair could not have passed between them. They resembled the tight overlapping of peanuts in a shell. (In a similar growth, Tauber uses a cauliflower as a comparison.) In the operation, the result of this articulation was that when a part of one face was bitten off, the combination was unlocked with liberation of the remainder of that portion. These peculiarities of growth seem proof—to the author, at least—that this multiple osteoma had several foci, which were, possibly, the frontal sinus, the junction of the frontal and ethmoid, the ethmoid, and the turbinates—and that all these different simultaneous growths were finally jammed and moulded together.

3. Etiology.—This growth certainly covered a period of ten years and probably a much longer one. In a histologic report which Dr. Jonathan Wright* was kind enough to make on slides of the osteomatous bone from the first operation, he states that the Haversian canals were markedly enlarged with a proliferation in them of an embryonic connective tissue or perhaps the remnants of the processes of the giant bone cells. It is probable that this osteoma found its origin, as many authors believe, in some embryonic growth-fault in the fronto-ethmoidal region. But one may ask, what irritation caused so excessive a production and formation? It is impossible to

*Dr. Wright's opinion was given on slides from sections of the first operation, before the autopsy report had been made. He inclined to the opinion that the growth was an osteosarcoma, without, however, ruling out the possibility of osteoma with syphilis.

determine whether the sinusitis of many years' standing had antedated the osteoma and acted as a stimulant for its growth, although that is a distinct possibility. It may be said, however, with very great certainty, that the osteomatous condition, if not secondary to the syphilis, was greatly aggravated by the acquisition of syphilis.

4. The necessity for early treatment cannot be too strongly stated. Reports of similar cases show that so good a subject as the patient had every chance of recovery if the operation had been performed before the growth had invaded the cranium.

5. Although at autopsy an abscess was found in each frontal lobe, no sign or symptom referable to them had presented at any time during the patient's life with the possible exception of the last few days.

6. This case, in which the patient enjoyed extraordinarily good health, nevertheless revealed sinusitis and syphilis, both of long duration. As the literature shows a good many cases in which, because of the patient's excellent health, no Wassermann was taken, the present writer would like to urge that no means of examination be left untried for patients in whom an osteoma of the nasal accessory sinuses is detected.

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LXII.

CASE OF PLASTIC REPAIR OF THE ALA OF THE NOSE, BY MEANS OF DOUBLY EPITHELIALIZED FLAP FROM FACE.

By ROBERT H. IVY, M. D., MAJOR, M. C.,

WASHINGTON.

Through the courtesy of Major J. H. Bryan, of the Walter Reed General Hospital, I was asked to see the following case:

Sergeant F. A. H., Medical Department, age twenty-four years, on May 2, 1918, was thrown from the side car of a motorcycle and received a severe laceration of the nose and face, which was immediately sutured. The entire right ala of the nose was torn away.

June 1, 1918. Examination on admission to the Walter Reed General Hospital shows a scar on right side of face, extending from about the center of the upper lip upward, outward and then downward to a point about two inches in front of the right angle of the jaw. The right ala of the nose is gone, leaving the septum exposed on this side. (Figures 1 and 2.)

At the suggestion of Lt. Col. Harris P. Mosher, it was decided to attempt to replace the lost ala by turning a pedicled flap from the face, after first epithelializing the under surface of the flap by the method of Esser (*Annals of Surgery*, 1917, LXV, 297.)

June 19, 1918. Under 1 per cent novocain-adrenalin anesthesia a flap was cut from the region between the nose and the right cheek, with pedicle at outer angle of right nostril, and tip near the inner angle of the eye (Figure 3). A thin piece of dental modeling composition was moulded to the shape of the flap, covered on both sides with a Thiersch skin graft with raw surface out, taken from the inner side of the left arm, and inserted beneath the flap. The flap was sutured back in its original position with the Thiersch covered modeling composition under it, to allow the Thiersch to take and



Figure 1.



Figure 2.

thus epithelialize both the raw under surface of the flap and the raw surface remaining at the original site of the flap.

One June 27, 1918, eight days after the first operation, the sutures were removed, the modeling composition was taken out, and it was found that the Thiersch had grown very well to both raw surfaces, and that there was a thick, well nourished, doubly epithelialized flap for transplantation. Under novocain anesthesia the margin of the ala defect was freshened, the flap was turned down at right angles to its former



Figure 3.

direction, trimmed to fit the defect, and sutured in its new position with horsehair, in such a manner that the Thiersch-covered surface replaced the mucous membrane side of the ala. A hard rubber tube was placed in the right side of the nose for a few days.

July 15, 1918. A slight notch existed near the tip of the nose, owing to the flap being a little too short. The edges of this notch were freshened and brought together with horsehair sutures.

The results after these operations were fairly satisfactory, as shown by Figures 4, 5 and 6. The lower edge of the flap was too straight and the new ala did not have the normal rounded prominence. The size of opening of the



Figure 4.



Figure 5.



Figure 6.

nostril compared favorably with that of the sound side, and breathing was in no way interfered with.

July 22, 1918, an endeavor was made to build out the ala somewhat and to eliminate a crease in its lower border by making a pocket under the skin and inserting three small pieces of septal cartilage. The wound healed without trouble and there was some further improvement in the appearance.

The reason for reporting this case is that, so far as can be discovered, it is the first to be recorded in this country in which the doubly epithelialized flap method of Esser was used to repair the ala of the nose. The difficulty of obtaining a passable cosmetic result and of preserving the full patency of the nostril by the ordinary flap methods is well known. The results obtained in this case encourage one to believe that a satisfactory way of dealing with this problem has been found.

LXIII.

SOME ORIGINAL METHODS OF TREATMENT OF
LARYNGEAL STENOSIS.

BY SAMUEL IGLAUER, B. S., M. D., CAPTAIN, M. C.

CINCINNATI.

In this paper it is my purpose to describe some methods of treatment which I have employed to advantage in cases of chronic laryngeal stenosis. These methods are only applicable with patients wearing a tracheal canula, or in cases in which it was deemed best to perform a tracheotomy as part of the treatment. In addition there must be a real or a potential passage through the larynx to the tracheal fistula.

1. Dilatation by Means of a Rubber Tube Doubled Upon Itself.—This procedure is based upon the well known effect of the continuous elastic pressure of rubber tubing in promoting the resorption of cicatricial tissue. It follows the same principle which underlies the use of rubber tubes in laryngostomy, but has the advantage of being employed without the necessity of splitting the larynx.

The technic is as follows: A stout silk cord (A, Figure 1), about eight inches long, is firmly tied about the center of a piece of soft rubber tubing (B) of a diameter to suit the case. The tubing is then doubled upon itself and the free ends are firmly tied together with a second cord (C). The length of the tube, when doubled, should approximate as nearly as possible, the distance from the arytenoids to the upper margin of the tracheotomy. The spring wire taken from a Bellocq canula (or some similar appliance, such as a grooved director perforated at the tip) is threaded with a cord in the usual manner. The tracheal canula having been removed, the wire is introduced through the tracheotomy opening until it presents in the mouth (mouth gag), when the cord it carries is pulled out of the mouth. The wire is then withdrawn from below, leaving the lower end of the cord protruding from the

neck. In old tracheotomies, if any difficulty is encountered in passing the wire toward the mouth, it is best to incise the upper margin of the tracheal opening under local anesthesia.

The oral end of the cord is now tied to the free end of the string (A), and traction is then made downward upon the tracheal end of the cord, drawing the rubber tube into the larynx until its folded end presents at the upper margin of the tracheal fistula (Figure 2). At the same time counter traction is made upon the string (C) to prevent the tube from being drawn too far into the trachea. The tracheal canula is now reintroduced and the string protruding from the trachea is wrapped (clockwise) about the stem of the canula and is then fastened to the patient's neck with adhesive plaster. This is important, since it prevents the rubber tube from gliding past the tracheal canula. The string (C) is allowed to protrude from the patient's mouth (and fastened to the cheek with adhesive plaster), to serve as an extractor when the tubing is to be changed. Otherwise the tubing may be removed by depressing the patient's tongue and seizing the tubing with a forceps. Figure 1B shows the doubled tube in place in the larynx. Should the tube project too far into the larynx it may be cut off by depressing the tongue and seizing the projecting ends with a tonsil forceps, over which a snugly fitting tonsil snare is passed, and amputating the protruding ends of the tubing in situ.

In addition to the elasticity of the rubber itself, the tubing contains imprisoned air, which exerts pneumatic pressure as well. The tubing should be changed after several days, and larger tubing can be substituted. In making the change it is usually unnecessary to employ the Bellocq canula a second time, because during extraction the tubing draws the long string (A) after it, and this string can then be attached to the next size rubber tube, which is then drawn into place as before.

This procedure has been employed to considerable advantage in the course of treatment of some five patients. In one case with a complete subglottic cicatricial diaphragm, a passage was first made by blunt dissection, with the patient in suspension. Through this passage a single piece of rubber tubing was first drawn and allowed to remain. In a short

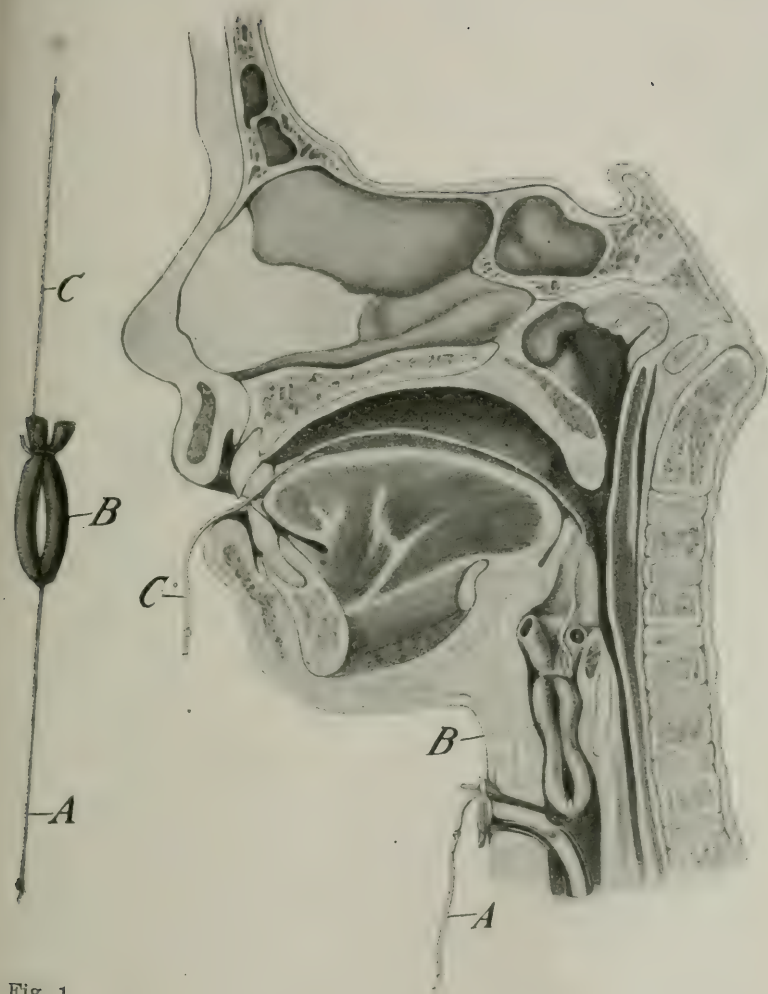


Fig. 1.

Fig. 2.

time this could be supplanted by the double tubing. The advantage of continuous elastic pressure without laryngotomy has already been mentioned. The chief objection to the method lies in the impossibility of oronasal breathing with the tubing in place.

Insertion of a Single Rubber Tube From Below.—Oral breathing can later be reestablished by the following modification of the procedure described above. A piece of rubber tubing of proper length and diameter is selected. A draw string is attached to each end of the tubing and one of the strings is then passed from below into the mouth, drawing the tubing into the larynx. The tracheal canula is reinserted and the tracheal string is then anchored to the plate of the tracheotomy tube, as in laryngostomy.

As soon as the stenosis has become somewhat dilated, oral breathing may also be partly reestablished by introducing a short intubation tube above the tracheal canula. In some cases of laryngeal stenosis, however, it is exceedingly difficult or even impossible to introduce an intubation tube in the usual manner. Under these circumstances, the following method may be employed.

INTUBATION BY TRACTION.

Two small holes (B. B., Figure 3) are bored into the lower end of an intubation tube, one on its anterior surface and the second directly opposite on the posterior surface of the tube (A). A stout silk cord (C) about eighteen inches long is then passed through both these openings in the intubation tube and the ends of the cord are tied together and are allowed to hang from the lower end of the tube. In addition, the head of the intubation tube should always be threaded in the usual manner (E). The tracheal canula is then removed and, as described above, a string about a foot long is now introduced through the tracheotomy opening until it presents in the mouth. The string (C), previously attached to the lower end of the intubation tube, is now tied to the oral end of the string. Traction from below is then made on the tracheal end of the string and, with a guiding finger in the larynx, the intubation tube is drawn into place. The tracheal canula is now replaced, and the string (C) protruding from the neck is fastened to the neck with adhesive plaster.

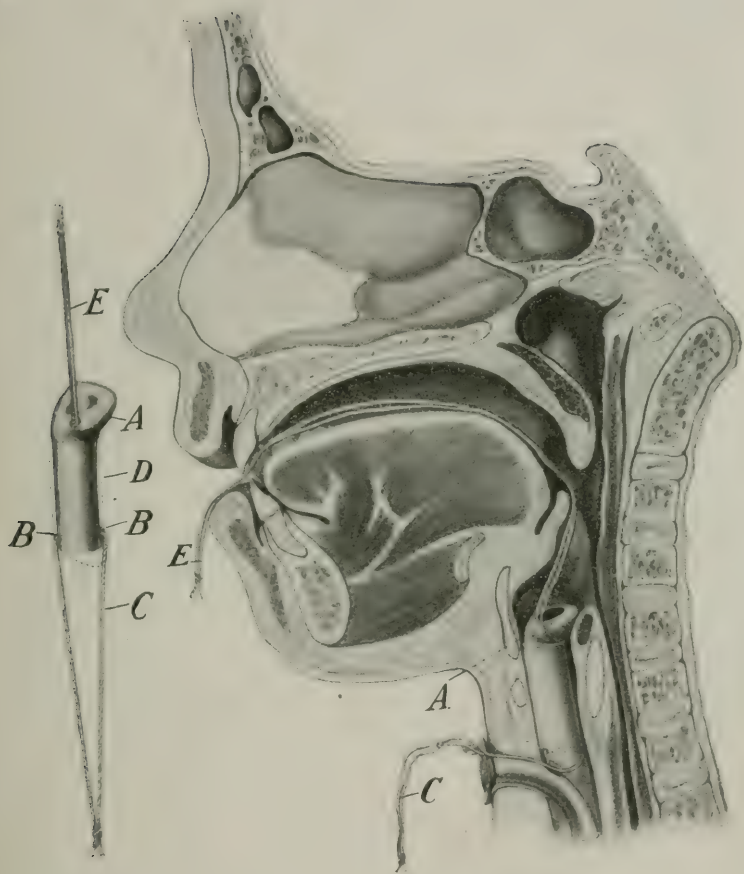


Fig. 3.

Fig. 4.

Following a suggestion by Dr. Lynah, the diameter of the intubation tube may be increased at will by stretching rubber tubing (D) (Figure 3) over the intubation tube. When thus covered, the traction string is then threaded through both the rubber covering and intubation tube at the same time. The rubber covering exerts continuous elastic pressure on the stricture. By allowing the rubber tubing to project slightly beyond the lower end of the intubation tube posteriorly the angle between the intubation and tracheotomy tubes is obliterated, preventing the formation of a spur in the trachea at this point.

Figure 4 shows the intubation tube in situ, with the strings (C and E) attached. In performing intubation by traction the technic, as described above, should be closely followed, since one can exert considerable force by this method. In one case when I neglected to pass the string C through both the lower openings in the tube, the lower lip of the tube caught in the posterior wall of the larynx and made a false passage into the esophagus. Fortunately, the patient made a functional recovery from this accident. Otherwise no bad effects have resulted from the employment of this method.

In the final treatment of these cases the tracheal canula should be left out and clamped Rogers or Lynah intubation tubes may be employed. Spontaneous extubation may also be prevented by employing the anchor string method of fixation which I have described in former publications.¹ According to this method, a long silk thread is tied into an annular groove in the intubation tube. After intubation the thread is drawn through the tracheotomy fistula and fastened to the skin with adhesive plaster.

1. Lancet Clinic, October 11, 1913.

Laryngoscope, August, 1916.

LIVINGSTON BUILDING.

LXIV.

REPORT OF A CASE OF OSTEOMA OF THE FRONTAL SINUS OF LARGE SIZE. OPER- ATION; RECOVERY.

BY JOHN F. BARNHILL, M. D.,

INDIANAPOLIS.

The patient, referred by Dr. J. D. Mochelle, a high school girl, sixteen years of age, had never had any previous illness. Her family history was good. At the time of examination she was of medium size and vigorous appearance. There was no evidence of tubercle or lues. No nose or throat ailment of any kind, and no complaint whatever except of a deformity of the forehead. She stated that while in school one day a year previously she noticed a slightly raised place on the forehead, which was large enough to be felt but not seen. This grew gradually until now, when the deformity is quite marked. There never was any pain about the forehead, nose or eyes. No bleeding from the nose had ever occurred.

On palpation, the bulging tumor on the forehead felt very hard. The skin covering it was thin but not adherent or inflamed. There was no crepitus. The eyes were straight and vision normal. An X-ray examination showed the tumor in the frontal sinus with apparent absorption of the anterior and posterior antral walls. (Figure.)

The operation was performed at the Methodist Hospital after the usual preparations, under careful aseptic technic. The usual incision for opening the frontal sinus was made, with the addition of a perpendicular cut upward in exactly the center line of the forehead, to give better access. The white glistening tumor lay under the periosteum, the anterior wall of the osseous sinus having been absorbed over a considerable area. With rongeurs the balance of the anterior bony wall of the sinus was removed, when the tumor was pried out with stout bone elevators, leaving its bed with a sharp, cracking sound. The ivory-like growth was smooth,

ovoid and somewhat of the density of a billiard ball. It was attached at the infundibulum, into which a branch extended which fractured at removal. There was, apparently, no point of attachment or adhesion to any other part of the antrum.

The posterior portion of the antral wall was absorbed over a wide area, and the dura correspondingly exposed, but was not adherent to the tumor, and was not inflamed or eroded.



The infundibulum was enlarged for better drainage, the flaps were stitched in place and gauze and bandage applied. Recovery occurred in a few days, with almost no scar or deformity. The young lady is in good health and no appearance of a return of the growth after one year.

The tumor, which weighed 600 grains, seems undoubtedly an osteoma. At this age we must not, of course, overlook the possibility of sarcoma. No symptom of sarcoma could be obtained.

LXV.

REPORT OF A CASE OF MENINGITIS FOLLOWING
OPERATION UPON THE MIDDLE TURBINATE,
WITH AUTOPSY FINDINGS SHOWING AN
OLD PERFORATION OF THE CRIBRI-
FORM PLATE OF THE ETHMOID.

By THOMAS J. HARRIS, M. D., LIEUT.-COL., M. C.

NEW YORK.

Meningitis of nasal origin, following operation or independent of it, in comparison with the number of such cases following suppurative affections of the ear, is a rare occurrence. The subject has been treated in recent years by Coffin, Killian and Dabney, among others.

Meningitis, dependent upon operative work confined to the middle turbinate, is still more rare, and the total number of cases reported is very small. During the past spring such a case occurred in the otolaryngologic service of the U. S. Army General Hospital at Fort Oglethorpe, and offers so many unusual points of interest that it is deemed worthy of being reported.

The patient was a young student officer who was first seen May 29, 1918. He was to all appearances a healthy man of twenty-six or twenty-seven years. He gave a history that a number of years ago he had sustained a fracture of his nose in the course of a football game. This incapacitated him for two weeks, since which time, twelve or more years ago, his nose had given him no trouble. In the course of a routine examination of the nose and throat, an obstructing growth in the right nostril was discovered. When his attention was directed to it, he admitted that the breathing on that side was considerably obstructed. He made no complaint of headaches and there were no signs of disease of the accessory sinuses. Examination of the nose showed a large mass, having its origin

apparently in the middle meatus, of sufficient size to interfere decidedly with respiration. It gave at first the appearance of an ordinary nasal polyp. More careful examination showed it to be the middle turbinate which had undergone cystic degeneration. Palpation with a probe gave the sensation of semi-density. The inferior turbinate was decidedly atrophic. The cyst under strict aseptic precautions was aspirated and a

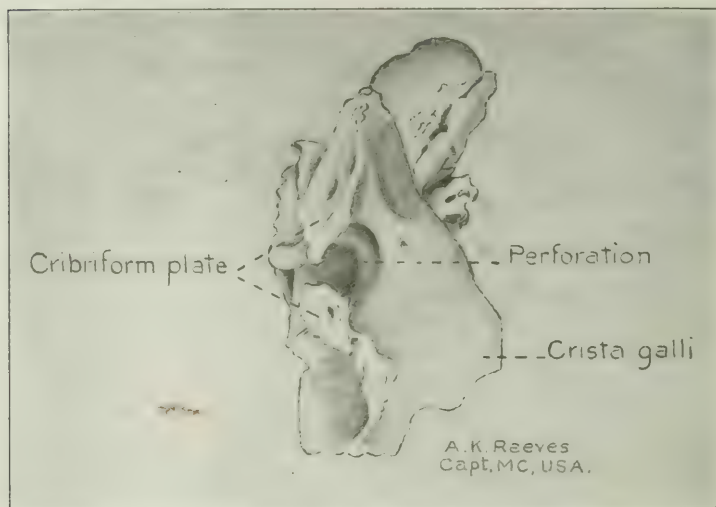


Fig. 1.—Drawing $\frac{3}{4}$ inch larger than specimen. Scale of enlargement $1\frac{1}{2}$ times, showing perforation in cribriform plate of ethmoid.

small quantity of clear fluid was withdrawn. This was sent to the laboratory for examination. The sensation of penetrating a thin but resisting wall was met with in the introduction of the needle.

The patient was seen the following day and had experienced no unpleasant results from the examination. The report of the laboratory of the cyst's contents was negative. Removal of the cystic turbinate was recommended and agreed to.

The patient was admitted to the hospital Monday, June 3d, and was operated upon the same day. Extreme care was

exercised so far as asepsis was concerned. Local anesthesia (application of 20 per cent solution of cocaine by packing) was employed. The duration of the operation was from two to three minutes. The turbinate was removed with a cold wire snare. There was no bleeding or pain in connection with the operation. In the absence of all symptoms, no operation was performed upon the ethmoid or other accessory sinuses. Packing in the lower part of the nose was introduced. Following the operation, the patient remained in the hospital for three days. Convalescence was uneventful; there were no after symptoms, no headache, no fever, no discharge. The patient was dismissed from the hospital the third day with instructions to report the following day for examination. He was seen the following day. His nose was in perfect condition, subjectively and objectively. No treatment was given. He was again seen Saturday, June 7th, and was feeling perfectly well. A slight bleeding from the operated side of the nose had taken place, which the patient ascribed to an examination at the infirmary. A small spot, regarded by him as the cause of the bleeding, had been touched with a solution of nitrate of silver by Capt. Pate. Examination showed the nose virtually well. The patient was discharged with the request to report the middle of the following week for final examination.

Sunday, June 8th, he was seen in his quarters about eight o'clock, complaining that he had been suffering from headache all night. It was learned that the previous afternoon he had attended a baseball game. At four o'clock he vomited. He was aroused with some difficulty and was clearly very sick. He was ordered to the hospital without delay.

A spinal puncture was performed, showing a decidedly cloudy fluid. There was a positive Kernig. A diagnosis of meningitis was made. He became rapidly more comatose until, when seen at two o'clock, he was in deep coma. He died without regaining consciousness, Monday night at 10:30 o'clock. An X-ray picture taken Saturday, June 7th, showed complete absence of both frontal sinuses and granulations in the right ethmoid.

An autopsy was performed by Major Keilty, whose report is as follows:

Cause of death: Meningitis, cerebrospinal; acute fibrinopurulent, pneumococcic. Contributory: Cystic degeneration of the middle turbinate with operation, complicated by failure formation of the cribriform plate of the right ethmoid bone.

Bacteriologic diagnosis: Pneumococcus.

Description: The body is that of an adult white male, about twenty-eight years of age, well nourished and well

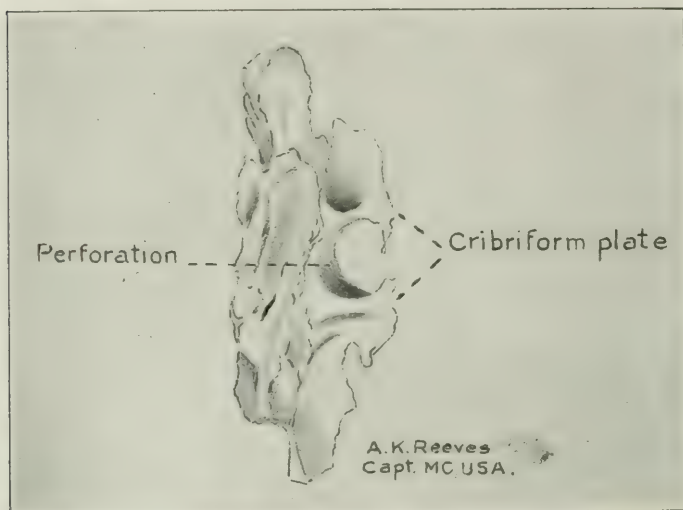


Fig. 2.—Anterior view. Drawing $\frac{3}{4}$ inch larger than specimen. Scale of enlargement $1\frac{1}{2}$ times, showing perforation in cribriform plate of ethmoid.

developed. Postmortem vigor is moderate and postmortem livor is present in the dependent positions. The chest and abdomen were not opened. There was an old scar over the right lower quadrant of the belly wall perfectly healed and tight.

The brain: The skull was opened by the usual incision. Upon lifting off the calvarium, a profuse exudate was noted over the convex surfaces of the cerebrum, more marked on the right side than on the left. The exudate occupied the subdural and pia arachnoid spaces and was more of the fibrinous than purulent character. This follows the usual

course of an exudate developed by this type of pneumococcus with chemotropic repellant action. The exudate was quite extensive over the entire brain, the base as well, and quite blocked up the cisterna magna. The smaller capillaries of the pia were extremely congested and in places showed small hemorrhagic areas.

The spinal cord was not removed, but the exudative process extended along the cord below the pons.

In removing the brain, it was noted that the anterior lobe of the cerebrum was adherent to the cribriform plate of the ethmoid on the right side. Some of the brain structure was torn during the removal. This would indicate that at least part of the process at this point was chronic. In the middle portion of this cribriform plate, just to the right of the crista Galli, an opening was found about five millimeters in diameter with a necrotic center. This necrosis included the dural covering. It was possible to pass a pair of forceps straight through into the nasal cavity. Thus a direct communication was established between the ethmoid sinus and dural space. Upon stripping the dura, the opening in the bone was found to be perfectly smooth and regular and without reaction. The bone about the hole in the plate on this side was compressed into a decided fossa as compared with the left side. After removal of the plate, the underlying ethmoid cells were found as a mass of necrotic material attached to the plate above and opening into the nose pharynx below.

The nature of the opening in the cribriform plate has several possibilities. The regular and smooth appearance associated with depression suggests a possibility of a developmental fault. On the other hand, the necrotic character of the ethmoid cells strongly suggests an extension of the inflammation as an otitis. The history of an old fracture the nose is in favor of the latter conclusion.

Bacteriologic studies on the exudate show the infecting organism as pneumococcus.

A smear was taken from the nose at the time of the operation and showed many gram negative and gram positive diplococci.

Specimen from spinal fluid showed pneumococci type II (atypical).

Specimen from autopsy showed pneumococci type II (atypical).

The tissue removed from the nose was submitted to Major Keilty for examination. His report follows herewith:

Gross: The tissue submitted consists of a small mass of mucosa and submucosal tissue.

Microscopic: Three blocks of tissue were cut. The sections showed the mucosa and submucosa the seat of an intense inflammatory process. In some places the modified epidermal layer has been loose, as if by ulceration. The blood vessels are decidedly congested, and the lymph spaces are filled with an exudate material fibrin. The cellular exudate was made up of polymorphonuclear leucocytes with large numbers of plasma cells. In addition to the acute process, there is evidence of an old chronic inflammatory lesion as evidenced by heavy strands of connective tissue in the submucosal position.

The diagnosis is based on the tissue as submitted.

Diagnosis: Rhinitis, acute phlegmonous superimposed upon. Rhinitis, chronic hypertrophic.

Comment.—There is little question that the perforation in the plate had existed since the time of the injury to the nose twelve years before. In spite of the absence of symptoms, there was clearly present an old ethmoiditis, latent in character, associated with a latent meningitis. There was probably a direct communication between the cystic turbinate and the brain. As was stated by one of the surgeons who saw the case, the slightest shock was sufficient to light up the inflammation. The operation, slight as it was, served as the exciting cause.

A case quite similar in nature has recently been seen at Camp Lee, in the service of Major E. W. Day, who kindly communicated the chief facts in the case. It was a case of chronic ethmoiditis, with polyps, pus and headache. The polyps were removed and an attempt was made to discover ethmoid cells without success. Meningitis developed in the course of a week, with death. The postmortem showed an old necrotic cribriform plate and a probable localized meningitis existing before the operation. In the opinion of Major

Day, the operation had broken down the walled-off area and allowed it to become general.

In addition to the case of Day and our own case, the following report on deaths due to meningitis of nasal origin, appears in an article by Dabney, entitled "Deaths Attributable to Intranasal Operations and Other Instrumentation," in the *Annals of Surg., Gyn. and Obst.*, 1916.

DEATHS FROM TURBINATE OPERATIONS.

"1. Removal of the inferior turbinate resulted in death in Gregory's case, though the autopsy showed a fractured ethmoid cell which might have caused the terminal meningitis.

2. Kümmler's case died from the result of a tear in the dura and the fracture of the cribriform plate, apparently caused by the removal some time before of the middle turbinate. The injuries were not discovered until after the death from what was suspected to be an acute frontal sinus abscess. The autopsy revealed the basic trouble and cause of the cranial involvement.

3. The danger of removing the entire middle turbinate in acute frontal sinusitis without first trying ordinary irrigation, is illustrated by the death in the practice of a colleague of this city. The advanced age of the patient made her an especially bad risk, but the ethmoid disease under the middle turbinate soon flared up into an acute inflammatory process, and she died in four days from meningitis. There was an external opening made into the frontal sinus, but the operation on the turbinate caused the trouble.

4. The resection of the anterior end of the middle turbinate caused a meningeal death in Merlse's case as reported by Boenninghaus.

5 and 6. The classic cases of Quinlan and Wagner, each of whom lost a case from galvanocauterization of the middle turbinate, are well known.

7 and 8. Rethi, however, adds to the records a case of Lange and another of Lublinski, dead from the same cause—meningitis following galvanocauterization of the middle turbinate.

9. My own case was particularly unfortunate, as it was an operation of choice and one in which there was so little done under ether. The right inferior turbinate was resected only to the extent of the inferior edge, about one-third of the bone being removed anteroposteriorly. In addition, with the forceps, the remains of the adenoid tissue were removed. He took the ether very badly and never regained consciousness after its administration, passing into violent convulsions the next morning and later lapsing into coma, dying the third day from cerebrospinal meningitis. A few moments after death a thin stream of cerebrospinal fluid trickled down the upper lip, having escaped from the cribriform plate on the side operated upon. That the patient should never have come out of the ether but passed insensibly into the unconsciousness of meningeal infection, and that this infection should have followed so insignificant an operation as indicated, strongly suggests that the patient already had a latent meningitis at operation."

These make in all, with my own case and that of Day's, eleven cases of meningitis following operative work upon the middle turbinate. Of these, cases 5 and 6, 7 and 8 followed the use of galvanocautery upon the middle turbinate, and so may be dismissed from the total number. Of the remaining seven cases, the one reported by Dabney followed an operation upon the inferior turbinate. There is little question, however, that it was the middle turbinate that was injured, producing the meningitis. It would appear in this case that there must have been a fracture of the cribriform plate at the time of the operation, with the probability of a latent meningitis.

The unfortunate results in all of these cases were unavoidable. Considering the countless operations performed upon the middle turbinate without serious consequences, the few fatalities here noted can only be explained by abnormal conditions existing at the time of the operation. In the case of Dabney and myself, there was unquestionably present an old perforation of the cribriform plate. Such a fracture was entirely impossible of discovery in advance of the operation. This forces upon one the unavoidable conclusion that in every case most extreme care should be taken at the time of the operation upon the middle turbinate.

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LXVI.

CHANGING METHODS AND ADVANCES IN THE TREATMENT OF PROGRESSIVE DEAFNESS FOLLOWING CHRONIC HYPERPLASTIC OTITIS MEDIA.

(SECOND COMMUNICATION.)

BY FRANCIS P. EMERSON, M. D., MAJOR M. C.,

BOSTON.

In the etiology of chronic secretory—exudative—catarrhal or hyperplastic otitis media, aurists are in accord as to the pathology and necessary treatment of the eustachian tube and middle ear, but there is still a wide diversity of opinion in regard to the conditions that have preceded the chronic state and as to what steps are necessary to arrest or improve a disease that affects the majority of our office clientele. If we consult our latest textbooks we find that adenoids are mentioned as first in the list of causes, and here, especially in children, there would be no controversy. The second (to still quote from the latest textbook), recurrent attacks of subacute catarrhal otitis media, in which resolution is never quite complete, is given as a cause. Third, frequent attacks of acute rhinitis, each attack giving rise to more or less tubotympanic congestion. Fourth, obstructive nasopharyngeal lesions resulting in chronic tubal catarrh which later involves the tympanum. The writer would respectfully submit as a substitute for these subdivisions, except the first as a primary cause, the result of early infections usually the sequelæ following the infectious diseases and la grippe. These diseases leave a streptococcus focus which becomes chronic and is indefinitely subject to acute exacerbations, causing recurrent attacks of subacute catarrhal otitis media, frequent attacks of what seem to be acute rhinitis, yet are not fresh infections, but the lighting up of this chronic focus, and lastly making obstructive nasopharyngeal lesions potential factors in deafness only

because the impaired drainage keeps up the chronic infection. In taking the histories of these chronic cases one is impressed with the fact that these patients have had various manifestations of the same infection, dating back to an attack of diphtheria, measles, scarlet fever or la grippe. These infections have resulted in secondary involvement of the lymphatic or osseous tissues, such focal processes being subject to acute exacerbations, but existing as a low grade process in the interval. These exacerbations are so constant that it is a question whether acute infections ever take place in a normal nasopharynx. The writer confesses that in late years he has not been able to make a differential diagnosis between otitis catarrhalis adhesiva and the hyperplastic catarrhs from the viewpoint of etiology. Many cases showing but little evidence of secretory changes in the membrana tympani with the nasopharynx clean and no thickening of the mucous membrane have had a definite chronic focus in the throat. In these cases the writer formerly relied upon the hearing test for a diagnosis. He now believes all of them to be due to a toxin, and any differential diagnosis should be based on the tissue reaction in the tympanum rather than upon any difference in origin. Some of the cases here cited show the final stage of a hyperplastic process where the hypertrophic changes have been succeeded by secondary atrophy and nerve degeneration after a steady progression from the throat or nasopharynx to the eustachian tube, tympanum and inner ear. Many other cases with apparently the same etiology are followed by extreme deafness, showing toxic nerve changes that seem to have been caused by absorption directly through the lymphatics or blood streams. The toxic focus that caused the nerve changes in the inner ear probably accounts for the intestinal toxemia referred to by Stucky and other writers.

May 28, 1917. E. J. P., born Rhode Island. forty-five years old; married; merchant.

Past History.—Diphtheria; measles; scarlet fever. No aural history in childhood. Rheumatism seven years ago. Laid up six to seven weeks. Acute infections in the head constantly. In 1901 had la grippe, and lost the hearing in the right ear gradually. No history of discharge. Tinnitus with bad weather. Hearing varies with climatic conditions. Not

so good when tired. History of operation in left nose twenty years ago. Never been right since.

Examination: Nares.—Left, posterior spur and synechia almost closing the posterior naris. Contact with posterior end of inferior turbinate. Cryptic tonsillar disease. Central adenoid. Both eustachian tubes obstructed at the isthmus. Right more open at pharyngeal end.

Ears.—A. D., membrana tympani indrawn. Capillaries injected along the manubrium. L. R. gone. Ground glass appearance.

A. S., membrana tympani indrawn. Ground glass appearance. All folks above 512 heard.

R.		L.
1/6/25	W. V.	1/6/25
11"/24"	R512C ²	6"/22"
6"/9"	256C ¹	6"/8"
	+<W	
96	L. L.	96

No alcohol; tobacco moderate; no venereal history.

X-ray of the teeth and sinuses negative.

Operation at Brooks Hospital, May 29, 1917. Synechia removed. Spur removed with saw. Both antra opened. Tonsil and adenoid operation. (Right tonsil contained free pus.)

November 16, 1917. Right eustachian tube. Duel's electric bougie (constriction thick at isthmus and would admit only the second size Yankauer bougie). Injection along the manubrium disappeared. Tinnitus stopped. Reaction caused return of tinnitus and tube could not be bougied.

December 28, 1917. Right eustachian tube, electrolysis.

February 28, 1918. Both tubes open. Bougied, argyrol, 20 per cent, on cotton applicator. Sinusoidal current (multiplex and slow), using each five minutes in each ear.

The above case shows a hearing test resulting from a toxic focus. As complications we have marked nasal obstruction, lymphoid tissue in the vault, and decided narrowing of both eustachian tubes at the isthmus with diseased tonsils, the free pus in the tonsils being the most important.

Status Praesens.—After treatment for a year his eustachian tubes are open, the tinnitus and feeling of obstruction gone,

but his hearing remains unchanged. He has had one acute infection during the year at the time of a general epidemic.

If we admit that a pyogenic focus can be present throughout life as a streptococcus infection, subject to acute exacerbations, then we must concede that toxemia with subsequent nerve degeneration plays a more important part in nonsuppurative middle ear deafness than we have supposed in the past. From analogy we would expect that the synapses of the auditory pathway that are sensitive to the poisons of quinin, salicylic acid, morphia, alcohol, tobacco, etc., would also be vulnerable to constant toxic absorption from a focal process. Clinically this seems to be so, and also there seems to be a selective action that sometimes involves the cochlear and sometimes the vestibular branch of the auditory nerve.

It is known by all aurists that following a suppurative otitis media the ossicular chain may be broken by necrosis and sloughing, leaving wide gaps in the conducting apparatus, in addition the membrana tympani may be gone and yet the patient may hear very well. Cases of *effectiva* otitis media may show calcarious deposits with marked thickening of the whole drum, and yet there may be a fairly good functioning ear. On the other hand, many cases of catarrhal deafness may show but little change in the membrana tympani and yet have considerable loss of hearing, especially in the upper register. Is this due to changes in the conducting apparatus or is it due to beginning auditory nerve degeneration, or to both causes? In the judgment of the writer, it is not necessary to have marked changes in bone conduction, unless it be to raise it in the early stages to have toxic nerve deafness in connection with the evidence of chronic hyperplastic otitis media. In these cases there is often a hearing test that is almost identical on both sides. Represented graphically it would be like the following for a chronic condition.

Malleus movable. Folks above 512 heard faintly or not at all. Tinnitus marked:

R.	W. V.	L.
Shout		Shout
12"/22"	Rinné 512C"	10"/20"
	W>+	
512	L. L.	512

This patient, forty-eight years of age, commenced to be deaf as a girl, following scarlet fever. Diseased tonsils with a low grade pharyngitis and progressive loss of hearing without marked attacks of tonsillitis was the subsequent history. In cases of this type the writer believes that in the hyperplastic stage of catarrhal otitis media mechanical obstructions to the sound waves is an important factor in impairment of hearing. When, however, secondary atrophy has commenced and the infection has extended well into the eustachian tubes as a chronic process, then the effect of toxemia upon the auditory labyrinth or auditory nerves is equally important with extension from the tympanum. Tinnitus, which is only another name for vestibular irritation, has for its exciting cause changes in the eustachian tubes more often than anywhere else. The loss of tension or the relaxation of the membrana tympani being not so much a cause of deafness as is the fact that this condition indicates a wide open and usually infected eustachian tube with secondary atrophy, except in a few cases when it is due to autoinflation or repeated Politzerization.

The accompanying hearing test shows the result of a long continued toxic process acting in the same way as the systemic poisons upon the auditory labyrinths or auditory nerves. These cases are very common in which the hearing test is almost identical on both sides, the stapes movable, and in which a diagnosis of otitis catarrhalis adhesiva is usually made. The clinical history is one of frequent days marked by malaise, the hearing is worse with the exacerbations of the throat irritation or exhaustion, and the etiology dates back to a streptococcus infection following either grippe or the infectious diseases. The writer has seen many similar cases that were examined earlier, while the Rinné test was still positive, that seemed to point to some systemic poison and in which syphilis was considered as a probable cause. A careful history often revealed a very definite beginning of the deafness, with the exciting cause still active after a long number of years. In many cases the pharyngeal vault is free of lymphoid tissue and there is no history of head infections. The patient may even deny any tendency to sore throat, and yet the degenerate and infected tonsil in adults is usually the seat of the autointoxication and deafness. We may not be

able to make a diagnosis of a toxic focus, however, without noting the injection of the pillars of the palate, the perverted secretion of the pharynx, and the location of acute exacerbations, the macroscopic pathology of the gland itself not being sufficient ground upon which to base our conclusions. In association with these cases of lymphoid infection are many latent antra and apical abscesses of the teeth that may be overlooked more easily than pyogenic foci elsewhere, as, for instance, the ethmoid labyrinth. In chronic hyperplastic otitis media frequent attacks of rhinitis or recurring attacks of tubotympanic congestion are the rule, because the primary cause remains latent, and exhaustion is as productive of an acute exacerbation as is exposure. Whether the otoscopic examination of the tympanum indicates a previous chronic catarrh or is clear, depends upon whether the toxin was absorbed directly through the lymphatics or blood stream, or first caused a low grade process in the epipharynx, tube and tympanum. Both conditions may obtain in the same patient with the same etiology.

The following case is typical of a low grade infection existing for years, causing a chronic hypertrophic otitis media. The long continued toxemia has resulted in beginning auditory nerve degeneration, giving a typical hearing test:

March 18, 1918. Mrs. R., fifty-two years old; born, Massachusetts; married.

Past History.—Always well and not subject to acute infections. Commenced to grow deaf twenty years ago. There has been a gradual loss of hearing each year since. She has been under the constant care of a good aurist, whose treatment has been directed largely to the tubes.

Vertigo, no history of. Tinnitus, slight once for twenty-four to forty-eight hours. Headaches, history negative. Hearing not affected by climatic conditions. Scarlet fever at four years, diphtheria at fourteen years, measles at ten years. Throat trouble commenced as a child.

Examination: Ear—A. S., but little change in M. T. A. D., M. T., ground glass appearance. Manubrium not injected. Indrawn. L. R. gone. No areas of atrophy or thickening.

Nasopharynx, breathing free. Septum straight, no posterior

hypertrophies. Drainage good. No infection. Accessory sinuses negative. R. fossæ, free.

Pharynx—Low grade pharyngitis, especially marked on the sides. M. M. looks thickened and darkly congested.

Tonsils—Cryptic tonsillar disease. Both small and submerged. Patient now states that for years she has had an unusual amount of thick secretion in her throat, especially in the morning. That it is not unusual for her to get up nights to clear her throat and that the throat is always rough.

Teeth show no apical abscesses.

Hearing—

R.		L.	1024C ³ faint in A. D.
Shout	W. V.	Shout	2048C ⁴ not heard in A. D.
7"/15"	R512C ²	5"/15"	2048C ⁴ faint in A. S.
	Weber>+		No stapes fixation
	G.		(Gellé test negative)
256	L. L.	256	Air and bone conduction both lowered.

Diagnosis.—Both—Otitis media secretory chronic with a low grade pharyngitis, the result of a chronic tonsillar infection. Beginning auditory nerve degeneration.

Treatment.—Tonsillar exenteration. Topical applications to pharynx.

It is well to emphasize in connection with this case the fact that it is not necessary to have a history of repeated attacks of tonsillitis, or to be able to demonstrate the presence of free pus in the degenerate type of tonsil so often found in patients between forty and sixty years of age. All cases that are causing toxemia do have, in the experience of the writer, an accompanying low grade pharyngitis with roughness and a tendency to clear the throat on rising, and perverted secretions. In this case the right ear shows the result of a chronic catarrh in the right tympanum. The left membrana tympani is clear, of pearly luster, and the light reflex is present, yet the hearing tests are practically the same.

To conclude, we find our etiology to consist in a chronic infection subject to acute exacerbations with varying degrees of virulency, constantly tending to invade contiguous as well as remote structures by continuity or through the lymphatics or blood stream. The tissue reactions in the tympanum, espe-

cially about the ossicular joints, seem to be the same as the reaction in other articulations to the irritation of a definite toxin. It is, therefore, obvious that treatment will be useless after secondary atrophy, arthritic changes in the ossicular articulations, or auditory nerve degeneration has taken place. The one serious problem is to establish immunity to a chronic infection. Drainage is essential, but there are secondary foci beyond our reach in many chronic cases. These cases must be treated on broad lines of corrected metabolism, hydrotherapy, out of door living, rest, etc., as well as locally, remembering that audition is only one function gone wrong in the symptom complex.

The improvement to be expected cannot be determined by the duration of the deafness or age of the patient, but by a careful examination. Very many cases can be helped, as shown by actual hearing tests. In others the process can be arrested. Many will have relapses on account of secondary foci and poor resistance. Others will show beginning auditory nerve degeneration, but, eliminating those cases that have passed beyond our aid, there are still a large number where we can expect good results that will be in proportion to our thoroughness and patience in searching out and draining chronic toxic foci and curing the attending infection. One point that should be emphasized is that very early in the hyperplastic catarrhs you may have beginning auditory nerve degeneration without marked lowering of the bone conduction, as well as changes in the tympanum.

Most of the cases here cited represent the terminal stage of a long continued hyperplastic process. At the beginning, one ear is more involved than its fellow, but with time the infection extends to the opposite side, until, in many cases, the hearing may be identical. If the advance has been by way of the eustachian tube and tympanum, the hearing for the two sides is more apt to vary than when the toxin acts directly by way of the lymphatics and blood stream. It is obvious that any improvement depends upon early removal of the cause and that any treatment by inflation or other means that does not take into consideration the existing infection is a loss of time and makes the patient ultimately worse, except an occasional use of such treatment in the hypertrophic stage.

LXVII.

ESOPHAGEAL OBSTRUCTION DUE TO ACCESSORY THYROID.*

BY FREDERICK E. HOPKINS, M. D.,

SPRINGFIELD, MASS.

A case labeled unusual sometimes exposes the limited observation of the reporter—the unusual to him being no rarity to those whose experience in large clinics brings numbers of cases of almost every possible variety.

The case of esophageal obstruction presented herewith may have some interest, even if to most of you the possibility of its being due to hypertrophy of an accessory thyroid would seem more reasonable than it did to me.

Mrs. A., American, about forty years old, came to my service at the Springfield Hospital, November 16, 1917, complaining of inability to swallow solids. There was no enlargement of the thyroid or any symptom to direct attention to this gland. Her general health was good, save for such loss of weight and strength as followed the inability to take sufficient food.

The obstruction was so marked and its location so definite to the patient that she thought she must have “swallowed a bone.” No foreign body was discovered by the esophagoscope, but about five inches below the level of the cricoid cartilage a soft, irregular, vascular growth projected into the lumen of the esophagus, from its posterior and left side.

A portion of this growth was removed and submitted to the hospital pathologist, Dr. Frederick D. Jones, for examination. When he reported this to be thyroid tissue, I was not a little surprised and more than a little skeptical as to the correctness of his diagnosis. However, Dr. Jones was positive as to the character of the tissue, and subsequent search of references to accessory thyroids made the diagnosis

*Read by title at the fortieth annual congress of the American Laryngological Association, held at Atlantic City, N. J., May 27th, 28th and 29th, 1918.

appear reasonable. A section is submitted for your examination. I will add that the vascularity of the growth was such that the removal of the specimen for examination was followed by sufficient contraction to permit of comfortable swallowing. The patient has recently reported herself so well that further treatment is declined for the present.

It is unnecessary to weary you with many references to the literature on accessory thyroids. The following are brief quotations from a physiologist, a surgical anatomist, a pathologist and two internists:

1. Howell: "Accessory thyroids varying in size and number may be found along the trachea as far down as the heart. They possess a vesicular structure, and no doubt have a similar function to that of the thyroid body."

2. Deaver: "Accessory thyroid glands occurring near the median line of the neck in the vicinity of the hyoid bone, and elsewhere in the neck, are regarded as being formed by division of the pyramidal process."

3. McCallum, speaking of the physiology of the thyroid, says: "Destruction of the thyroid gland in animals by operative extirpation is not easy, because there are practically always numerous minute nodules of the accessory thyroid tissue scattered in the neck, in the thymus, and inside the pericardium."

4. Wilhelm Falta, who quotes Maurer regarding the development of the thyroid: "The rudiments of the thyroid wander downward with the heart. Along the entire tract from the root of the tongue to the aorta may be found cut-off portions of thyroid glandular tissue, accessory thyroids, which may give occasion to the formation of abnormally situated goiters—tongue goiters, retrosternal goiters, etc."

5. Thompson: "Accessory thyroid glands have sometimes been found at the root of the tongue and in the pleura." Speaking of adenoma of the thyroid, he mentions "a rare malignant form as described by Hayward, with metastases of thyroid-like tissue in the lungs, bones and elsewhere."

Dr. Frederick D. Jones, a pathologist of this city, mentioned to me a like metastasis coming under his observation: "At the time of the removal of the growth—involving one of the lower ribs—the existence of the primary disease in the

thyroid was not suspected. Examination of this growth showed thyroid tissue."

6. Osler: "It may be mentioned that the aberrant, or accessory, thyroid gland may form large tumors in the mediastinum or in the pleura. I have reported two cases of this kind, and an instance is on record in which an enormous cystic accessory thyroid occupied the entire right pleura."

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LOCAL ANESTHESIA IN MASTOID OPERATIONS.

BY HENRY BOYLAN ORTON, M. D., CAPTAIN, M. C.

Nowadays in this great war, local and regional anesthesia have assumed a great importance in surgery, commensurately with the great evolution of local anesthesia, the procedure demands as much dexterity and experience as the operation itself. Local anesthesia has advanced fairly equally in all domains of surgery. We find it employed in ophthalmology, otology and laryngology to a great extent. It is my desire in this paper to speak of local anesthesia in otology and especially in regard to mastoids.

There is little need of going into the history of cocain and novocain. Everyone is familiar with it. Suffice it to say that it was only after cocain was used in ophthalmology by Koller in 1884 that local anesthesia was guided in a successful direction by the experiments of Corning in 1885, Roberts and Halstead of the same year, and then of Rectus and Schleich, Crile and others. Einhorn used novocain in 1905.

Contraindications.—Children and excitable and timid persons should not be anesthetized by this method, for the prolonged consequent nerve shock may lead to unpleasant complications, and interfere considerably with the operator. If the area of operation does not permit satisfactory local anesthesia, general narcosis should be preferred.

Preparation of the Patient for Local Anesthesia.—The terrors of the operating room and the bad impression which the patient receives from everything connected with an operation are removed, or at least considerably diminished, if a small dose of a mild narcotic be administered. Some claim that a soporific given the evening before is calming to the patient. We used small doses of morphin, grains one-sixth to one-fourth, one-half hour before the operation, and repeated at the time of the operation, but I am sure that there is advantage in using some soporific, especially in nervous women. Scopolamin has been advised by some, but the drug is not without

dangers and should not be used; I have seen some very bad results following its use. Novocain is less toxic, seven times less than cocain; it does not cause any damage to the tissues: it is soluble in water and easy to sterilize, and is capable of being combined with some adrenal preparation, which is very important. It is a white powder readily soluble in water and can be heated to 120° C. without any decomposition setting in. The dose may be large: as much as 90 grains have been administered without any unpleasant symptoms resulting. The untoward signs of toxicity are clonic tonic spasms and opisthotonus, restlessness and acceleration of respiration. Vomiting is not rare after administration by injection, but is quite far from significance. Braun and others have observed toxic symptoms as stated above in cases where 20 to 25 cc. of a 2 per cent solution. Fischer reports a case who became semicomatosed after 3 cc. of a 2 per cent solution. Hysteric attacks have been observed after administration. Balza reports one fatal case after injection of 3 cc. of a 2 per cent solution for dental extraction.

The majority of the cases where untoward symptoms developed were those in which operations were around the mouth, and in this connection it must be remembered that adrenalin is not without danger: lymphatics are very free around the head and neck, and probably some of the untoward symptoms were from the adrenalin and not so much from the novocain.

Notwithstanding these isolated cases of untoward disturbances, we must regard the drug as an anesthetic that can be administered without risk to the patient, bearing in mind, however, the possibility of an idiosyncrasy. Solutions were used by us in the strength of from one-half to one per cent. In some of the cases a little adrenalin was so used, but I question if there was any decided advantage, as the field of operation was kept clean by the use of Allport's retractors.

The solution was boiled in a water bath before each operation. The instrumentarium consisted of a syringe of great durability, handiness and facility of sterilization and one that could easily be separated into its component parts. We used a Luer type of 10 cc. capacity, with straight needles. We employed a sterile table, upon which were placed all the ob-

jects required for the local anesthesia. The preparation of the patient for the operation consisted of having his hair entirely clipped and shaved, washed with green soap and water on the night before the operation. Attention was paid to the intestinal tract to see that it was empty, and no food was given on the morning of the operation. One-half hour before the time set for the operation $\frac{1}{4}$ grain of morphin and $\frac{1}{150}$ grain of atropin were given hypodermatically, and the $\frac{1}{4}$ grain of morphin repeated at the time of the anesthesia. Patient was placed on the operating table and the field of operation scrubbed with gasoline, alcohol and ether, and then the entire side of the head and neck was painted with 3 per cent solution of iodine, cleaning out the external auditory canal at the same time. Sterile towels were placed around the head, the field of operation only being exposed.

The fact that no assistant is necessary for the anesthetic is by no means to be underrated, but one should be seated in front of the patient with his hand on the patient's pulse so that he may give the operator at any time the volume and rate. Further, by talking to the patient the assistant will be able to keep his mind off of what is going on. Our procedure is as follows: The skin is anesthetized along the line of incision from above the auricle to one inch below the tip of the mastoid, at about which point a deep injection was made to block off the auricularis magnus nerve. Another nerve requiring blocking off is the occipitalis minor, which is about $1\frac{1}{2}$ inches posterior to the external canal and on a level with the floor of the canal. It can easily be detected through pressure before injection. Then the needle is pushed in deeply through muscle and under the periosteum, also along posterior wall of the canal, which is a very necessary part to anesthetize, for if complete anesthesia is not obtained at this point it will be very painful to strip the periosteum from the posterior wall of the canal in exposing the spine of Henle. After completely anesthetizing the area it is best to wait from five to ten minutes for the solution to take effect.

The mastoid gouges can be used on the cortex with absolutely no pain to the patient, and there will be no pain until the mastoid antrum is reached. When the antrum is once located, the cavity is filled with the solution, which is allowed

to remain while the operator works in the cells at the tip, and by the time these are cleaned out the antrum can be cleared out without any pain whatsoever. The operation is completed in the usual manner.

Case 1.—A nurse who had pneumonia and empyema, operated on for mastoid, under novocain.

Case 2.—Private D. P., 143d Inf. Modified radical mastoid, done under novocain.

Case 3.—Private W. S. B., 143d Inf. Mastoid following pneumonia, followed by a second mastoid on the opposite side, both mastoids being done under novocain.

Case 4.—Private E. C., 143d Inf. Mastoid, done under novocain, following brain abscess.

Case 5.—Private A. B. E., 111th Eng. Sequestrum of bone removed under novocain.

Case 6.—M. P. B., 143d Inf. Secondary mastoid under novocain, the first one being done under ether.

Case 7.—Private J. H. B., 142d Inf. Mastoid following pneumonia, done under novocain.

Case 8.—Private J. H. H., 141st Inf. Pneumonia followed by mastoid done under novocain.

Counting one double mastoid, there were in all nine mastoids done under novocain, and on the day I left the hospital they were doing another one under novocain.

Results showed:

1. Perfect anesthesia without prolongation of the operation.
2. Absence of danger to pneumonia from inhalation.
3. Convalescent period shorter.
4. Postoperative pain much lessened.
5. It is to be recommended in all cases following pneumonia and empyema where ether is contraindicated.

I wish to thank my assistants for their untiring aid, for without whose help we would not attained the marked success we did: namely, Captains C. P. Schenck, W. Lebkicher, W. W. Boyne and J. Boone.

DISEASED FAUCIAL TONSILS: THEIR TONIC, INFECTIOUS AND REFLEX EFFECTS.

By J. LESLIE DAVIS, M. D.,

PHILADELPHIA.

Faucial tonsils, always conspicuous in medical theories and practice, in a measure mysterious, inciting suspicion and inviting investigation, have recently figured in higher favor than ever before through the stimulus which the last few years have given to the study of focal infections; and while the abundant evidence of widespread interest must be counted a favorable factor for progress, I must confess that I also find its influence not without a degree of dissuasive effect on one who would attempt to add a thought worthy the attention that the occasion invites.

My hope in outlining the topic of my task was as follows:

1. To add my bit toward the further recognition of the epoch making advances in recent years in the field of focal infections, and the relative importance of the tonsils as the chief factor.
2. To present some interesting clinical phenomena associated particularly with the toxic properties of tonsils which, in my opinion, have not been given sufficient consideration.
3. To endeavor to form a clearer conception of what really may be termed reflex phenomena, direct and indirect.
4. To summarize the evidence, which today is sufficiently conclusive to insure a true bill of indictment against the tonsils as the one greatest potential menace to health that is harbored within the human body.

With a fuller appreciation, however, on further investigation of the thoroughness with which nearly every phase of the subject has been handled, I feel that should I succeed in simply emphasizing the responsibility which our modern opportunities impose, my temerity in the scope of my undertaking may be forgiven.

Medical science is replete with instances where long observed clinical phenomena remained vague in their meaning till explained by laboratory research, among which the effects of diseased faucial tonsils have become one of the most notable examples. By the term diseased tonsils it is not my intention to include tonsils involved in acute infections nor those affected by neoplastic changes, but only that type in which is recognized the almost constant pathologic changes common to all ages, though usually more active in childhood and adolescence, which harbors within its crypts recurrently or continuously various and manifold pathogenic organisms, the most constant as well as most virulent of which are the streptococci, with their variable cultural characteristics. While the conditions which are responsible for the development of such foci of infection are interesting phases of the subject, they are beyond the scope of this paper, though it may not be without relative importance in this connection to recall that, according to Barnes,¹ "degeneration of the cryptic epithelium usually begins after the sixth month of infancy and is well advanced by the end of the first year." From this early opportunity for the establishment of infected foci to old age, no period of life is immune, though the years of childhood and adolescence are generally recognized as the most constant. These harbors of infection, with or without local manifestations, with or without local subjective symptoms, affected or infected adjacent or distant organs, membranes and tissues, were long ago suspected and recorded by various clinicians, but the principles involved and the intricacies of transmission remained to be explained in our present day by the combined studies of skilled bacteriologists and clinicians. Among those to whom great credit is due for their brilliant accomplishments toward the establishment of definite data along this line no reference to the subject should omit the names of Beck, Billings, Barnes, Cecil, Crowe, D. J. Davis, Loeb, Rosenow, Sluder, Shambaugh, Wood and Wright; while for a comprehensive and lucid presentation of the work which has been done along the line of obtaining conclusive evidence against the guilty tonsil I commend the recently published articles of Albert Barnes, J. M. Brown and Daniel W. Layman. All observations in my own experience regarding

the tonsils and the focal infecting source of numerous diseases are but corroborative of these authors, who I believe have as thoroughly as they have conclusively established the certainty of their declarations. To say that today we know that rheumatism, arthritis, pericarditis, endocarditis, nephritis, neuritis, appendicitis, cholecystitis, adenitis, iritis, and even cases of headaches, various forms of neuralgias, gastric and intestinal indigestion and intestinal autointoxication may be purely secondary to a focus or to foci of infection located elsewhere in the body, of which the faucial tonsils are the most frequent location, is to make a statement which can be demonstrated clinically and substantiated bacteriologically.

One line of investigation of diseased tonsils, which I am convinced, however, will yield more interesting results than have yet been revealed, is that of toxic absorption and transmission, a field in which the chemist's aid must also be summoned. From clinical observations for some years I make this statement with the expectation of more conclusive evidence in the near future, namely, that the poison of putrefaction in diseased tonsils exerts its most potent and far-reaching influence through its effect upon the liver or its biliary secretions. Whether it acts upon the liver in a way that inhibits the secretion of bile or whether it acts upon the bile itself as a neutralizing or transforming agent I am not prepared to say, but the ultimate effect is to produce intestinal autointoxication and hence indirectly to produce both the local and systemic symptoms of toxemia. Through this indirect process I believe the tonsils to be the most frequent and common cause of colds in the head, so-called bilious headaches, intestinal indigestion, and even appendicitis, by weakening resistance to infection rather than by direct or indirect transmission of the tonsillar infection itself. I further believe that many cases of cardiac arrhythmia are results of the same toxic influence and offer as a typical example the case of my own personal experience.

History.—In childhood I was subject to frequent sore throats, tonsillitis and colds; during adolescence the throat affections became less frequent, and I was considered in good health, though poorly nourished and not physically strong; the same physical conditions continued into early adult years,

though with each passing year the susceptibility to colds and throat infections continued to decrease, with the exception of two or three years following an attack of measles at the age of twenty, when the earlier susceptibility to colds recurred; between the ages of twenty-one and twenty-five three severe attacks of appendicitis were experienced, though successfully treated without operation, and they have never recurred since; I have never suffered any other severe illness, and though six feet two inches in height, my weight ranged between 130 and 135 for a period of twenty years, from the age of twenty to forty; at about thirty-five years of age I began to have occasional "sick headaches," and about five years later developed an irregular heart which at first would last only a few days or less and then probably seem normal for intervals of a week or two, or even longer; these intervals between attacks, however, grew shorter during the next two years, while the headaches occurred oftener and more severe. Examinations by three competent physicians gave assurance of no organic lesion, which had a most beneficent effect upon my mental attitude, since the arrhythmia was becoming so marked when lying in any position other than upon the right side that a comfortable night's sleep was rarely obtained, though the usual routine of each day's work was performed. Then the following associated phenomena were observed: namely, that the headaches were always preceded and accompanied by a bad taste in my mouth and an aromatic or acetone odor to the breath; that with the development of these symptoms the feces became clay colored, which a combination of calomel, blue mass and compound extract of colocynth would not only relieve, but when taken in time (as suggested by the peculiar taste as of tonsillar exudate) would in a large measure obviate both the headache and the heart irregularity. While this was a great improvement in both physical and mental comfort over the previous two years, it could not be called satisfying, and in August, 1916, under general anesthesia, my tonsils were enucleated. The first thing thought of on recovering consciousness was to turn on my left side and see if the heart would "behave." It did, and is now, nearly two years later, still regular. The characteristic premonitory taste has never returned at all, the headache has

not recurred more than two or three times, and then in a mild form, while the liver has functionated normally ever since, and my unvarying weight for the past year has been 168 pounds. I have many cases on record in respects similar to the above, though not all with the heart symptoms, whose results from operation were as encouraging as they were convincing.

It is surely evident that the toxic products of tonsils play a far more frequent and important part as etiologic and aggravating factors in both gastric and intestinal indigestion than has yet been fully appreciated, and when the chemistry and the toxic properties of the cryptic, or rather the entire intracapsular contents of caseous tonsils, shall have been as thoroughly worked out as the bacteriologic composition and the pathologic changes, I doubt not that we shall have added to both our diagnostic and treatment equipment a valuable aid in many so-called constitutional diseases.

An interesting phenomena observed in the occurrence of headaches or neuralgias associated with acute hepatic inaction or biliary inhibition is their frequency with approaching atmospheric storms. In fact, so closely are the two conditions associated, that by the functional disturbances of one so predisposed, the weather change can usually be prognosticated with remarkable accuracy. In other words, the physiologicofunctional storm is concomitant with the fall in barometric pressure that immediately precedes an atmospheric storm—the toxic symptoms subsiding with the falling rain or snow.

I have never seen these manifestations in anyone who did not have diseased tonsils, nor, on the other hand, anyone subject to such experiences who did not notice marked relief after the tonsils had been removed. Local disturbances, either subjective or objective, however, are very seldom observed during such occurrences—surely nothing that could be commonly associated.

The absence of local symptoms in the great majority of diseased tonsils has been and still is one of the chief retarding factors in the awakening of both the physician and the patient to the realization of the danger that lurks within the crypts of a tonsil that to all appearances is quiescent.

We hail with rejoicing every new evidence that we are

awakening to the seriousness of tuberculosis, of syphilis, of infantile paralysis and many other of the less tragic infections; the public is taught that the germs are lurking everywhere outside the body, and so effective have been the propaganda against them that every external hygienic measure for the prevention of their spread is almost universally recognized; and yet, to use a metaphor, in the vernacular of the hour, a mighty host of the most virulent germ enemies are already mobilized within one of the most advantageous positions within the human body, from which intrenched position every avenue is open by way of the respiratory, alimentary, circulatory and lymphatic systems for their advance toward undermining and destroying the resistance of every tissue to any and every germ with which chance might bring us in contact. The time is propitious when the public must realize, as they are already being taught to realize through the timely wisdom of a few municipal boards of health, that diseased tonsils are doubtless the most constant menace to the health of everyone, child or adult, and that the only cure or effective relief is their complete enucleation.

I frankly state that I believe the majority of tonsils are diseased tonsils, and that everyone whose tonsils are in any measure diseased would be healthier, stronger and happier without them—but I do not by any means advocate that all should be removed, regardless of other conditions. Every case is a law unto itself and must be studied carefully from every standpoint, that no existing contraindications may be overlooked. A point which I wish particularly to emphasize is that almost without exception critics of tonsil removal have been compelled to form their opinions from one of two things or both, namely, errors in diagnosis or imperfect surgery, and principally the latter.

This statement of criticism is made with the most charitable intention, not with the idea of discouraging anyone who would aspire to tonsillar surgery, but to encourage and insist that it must be undertaken with the fullest realization that it is an operation which demands the most thorough knowledge of general and localized principles of surgery and the careful acquisition of mechanical skill and precision. There are far too few surgeons who have mastered the art of tonsillar enu-

cleation, from whom the rest should take counsel and instruction, as there are far too many whose temerity in the undertaking is born of rashness rather than courage.

I have never seen a single patient whose tonsils had been completely and skillfully removed under the influence of a properly administered anesthetic, whether local or general, who was not the better as regards physical comfort and safety from the various systemic infections and toxemias.

Finally, I am prepared to affirm and to defend the following conclusions:

1. That while tonsils were most assuredly "created for some definite purpose," it is evident that in the present stage or age of human physical development (or degeneration) that their function is either nonessential or else there exists some vicarious functionary support, complete in its efficiency.

2. That a large percentage of tonsils are so diseased that their intended function is either suspended or destroyed.

3. That the greatest harm to the individual from diseased tonsils is from transmitted infections to other organs or structures or else, through toxic absorption, the weakening of normal resistance to those infections.

4. That the most harmful influence of the toxic element is exerted through its effect upon the liver and kidneys, especially the liver.

5. That the thorough and skillful enucleation of diseased tonsils, against which no physical contraindications exist, is today the most effective measure within our knowledge for the relief of existing secondary systemic diseases or the prevention of their future development.

LXX.

CONTRIBUTION TO THE STUDY OF
RHINOPLASTY.*

BY PROFESSOR E. J. MOURE,
BORDEAUX.

It seems that after the publication of the important work of Messrs. Nelaton and Ombredanne the question of rhinoplasty has been so completely studied and adjusted to the requirements that there is nothing further to be added to that interesting treatise. The various procedures for restoring a loss of the nasal appendage as a whole or any of its parts have really been set forth and discussed in a masterly manner in the work to which I have just made allusion. Furthermore, in setting forth the criticism of each method the authors have added their own personal note, following what they have called preferable procedures which they recommend using in certain cases determined beforehand.

But the present war has resulted in much more extensive destruction than that due to syphilis or surgical operations to which the nose has been subjected. Many wounds indeed exceed all anticipations and evade the most minute descriptions. Besides this, operations performed in consequence of war-wounds deal with cases where the soft parts and the framework of the nose are destroyed and also with those in which there are thick cicatricial keloid tissues difficult to remove and also to unite, and with the tendency to become infected and to suppurate, thereby rendering external restorations of the organ of smell very complicated and very hazardous.

Wounds from bullets are usually simple enough, causing little shattering especially when they make a single perforation which, if it does not involve the opening of the nostril, will cause slight disfigurement in consequence.

On the other hand shell and grenade fragments often cause extensive destruction of a part or even the whole of the nose (soft parts and framework) involving the neighboring parts, eyelids, cheeks, superior maxillaries, accessory cavities, etc.

*Translation made in the office of the Surgeon-General of the Army from the original which was published in *La Restauration Maxillo-faciale*.

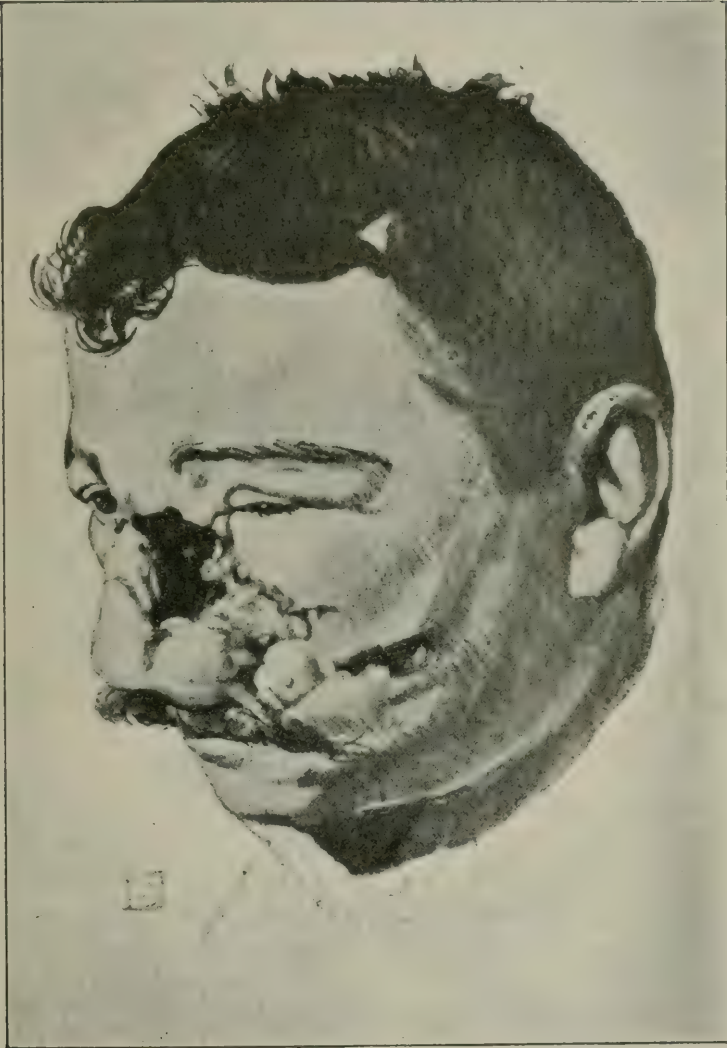


Figure 1. Condition of wound on admission.

What characterizes such wounds is that generally healing occurs with the formation of scar or new formed tissue, thick and adherent, which is consequently difficult to use for plastic work, to such an extent, that it is very often preferable to remove it and to replace it with other more pliant and easily

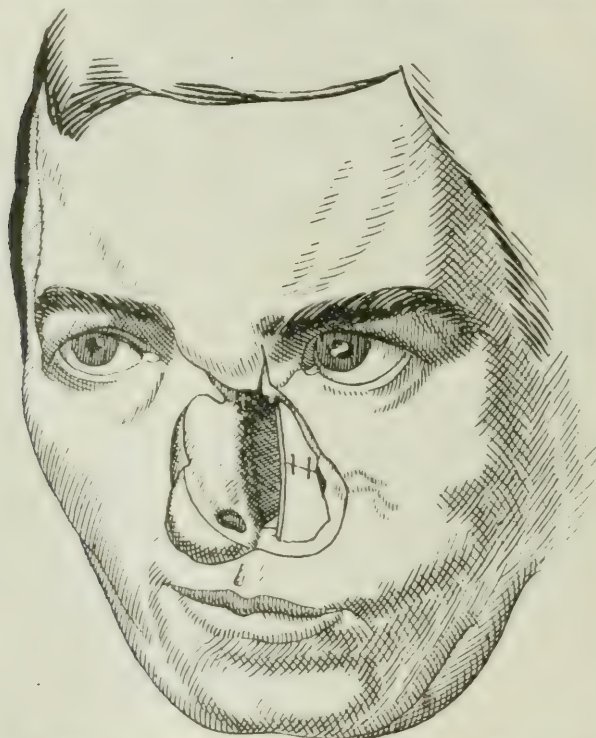


Figure 2. Tracing of first operation. The nose has been resected and the cicatrized tissues removed.

handled and more healthy issue, borrowed from the adjacent parts.

The skin of the forehead under the circumstances has very often been used by us when that region had been spared by the projectile.

In war rhinoplasty intended to supply loss of important substance, especially when there has been an anfractuosity, we must expect to make not one but several operations to

obtain the best esthetic results, which is the ideal sought. To close the orifices of communication with the outside and to restore the soft parts constitute usually the first part of the reconstruction treatment; to restore or to create some portion of the bony bridge of the nose will almost always be the indispensable accompaniment of the earlier operations. In order to render the subsequent operations easier and more effective, specialists, surgeons or physicians, whose duty it is to give the first treatment to those who have nasal wounds,

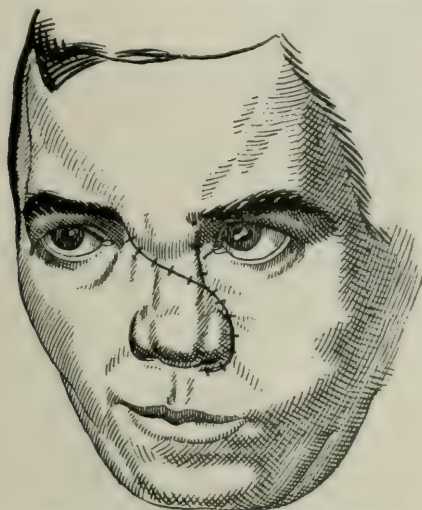


Figure 3. The same as figure 3, after suture.

should exercise the greatest care to preserve the natural passages, that is, the nasal cavities and especially the orifices of the nostrils. Indeed we have very often had occasion to see wounded men whose restoration externally was entirely satisfactory, but in whom the nasal passages were filled with fibrous cicatricial tissue, making nasal respiration impossible or in whom the natural orifices were subjected to atresia or closed by vicious cicatricial growths.

Therefore to retain the respiratory function, where there has been a wound of the nose or the face, it should be the first duty of the surgeon to insert a gauze tent into the nasal

orifices and later a rubber drain. The esthetic treatment will come last and will be almost secondary.

This part of endonasal therapeutics was not subject to study by Nelaton and Ombredanne, who had no special reason to devote their attention to it as they were concerned especially with external imperfections in the form of the organ of smell, imperfections caused by diseases or operations which, in the main, would not interfere with the respiratory function of this advance sentinel of the organs of respiration.



Figure 4. View after permanent cicatrization.

Serious or even slight wounds in the face and nose injuring both the outside and inside of this organ require in consequence a treatment which takes care at the same time of the functions which it is intended to conserve: respiration and the sense of smell as well as its external form.

The case, with illustrations here reported, was particularly interesting from these different points of view. It is chosen from among many because of the extent of the lesions and the perfect result obtained from the functional and esthetic points of view.

Open wound in the nose and face (left side) caused by a grenade fragment. Nasal plastic, including the bony bridge (crest of the tibia). Service of Prof. Moure.

Sergeant V.—Thirty-four years old, Fifteenth Infantry. Wounded in face Feb. 1, 1915, by a fragment from a grenade. Considerable loss of the nasal substance extending from the middle of the nose to 1 cm. from the intersuperciliary line and extending externally and downward towards the left ala. This opening was at least 1 cm. wide and 4 cm. long and the soft parts were divided as in paralateronasal rhinoplasty. The



Figure 5. Second operation. Removal of keloidal tissues; frontal flap with adipose tissue.

bones of the nose proper on the left side and the floor of the nose were broken away and even destroyed. Through the opening the septum was observed forcibly turned to the right side and with two apertures cut as if with a punch, parallel and extending to the bony bridge of the nose. There was edema of left lower eyelid but no trace of facial paralysis.

The left maxillary sinus, which was opened and which was infected and suppurating, was at that time (March 20, 1915, when the patient arrived in the hospital), in good condition, and there was no nasal secretion.

After having reestablished the caliber of the nasal chambers, obstructed by the cicatricial tissue, by removing all of the cicatricial tissue which blocked up the nasal chamber and formed synechiae between the inferior and middle turbinates particularly on the left side, we proceeded on June 21, 1915, to the formation of the nose, freshening up the edges and removing the cicatricial tissue and replacing the nose in position.

In spite of this operation, it was unsuccessful; the original opening did not close up, for the reason that at the newly

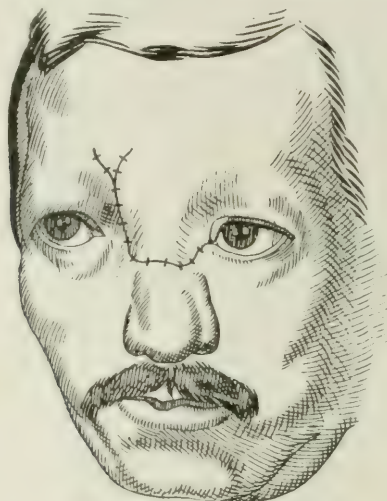


Figure 6. Suture of wound.

formed cicatricial tissue a misshapen opening still remained.

On Nov. 9, 1915, a new operation was undertaken. All of the cicatricial tissue which formed an imperfect restoration was removed (Fig. 4). These keloid cicatrices were replaced by a frontal strip cut as shown in the fig. 5, so as to provide healthy, pliable tissue. The patient was then dismissed for a month of convalescence. On his return, Dec. 1, 1915, he was massaged under warm air which gave good results by making the tissues of the nose pliable.

The outside opening was thus completely closed; the patient was breathing satisfactorily through his two nares; the nasal cavities were not entirely free because of the deflection

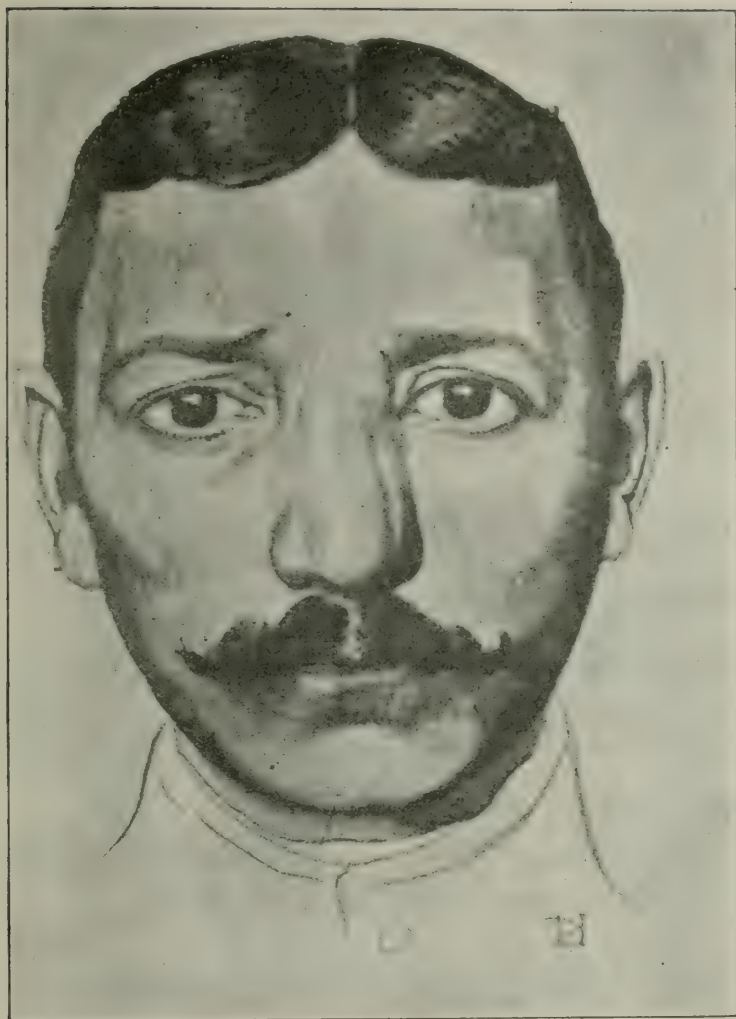


Figure 7. Full view of the face after the third operation.

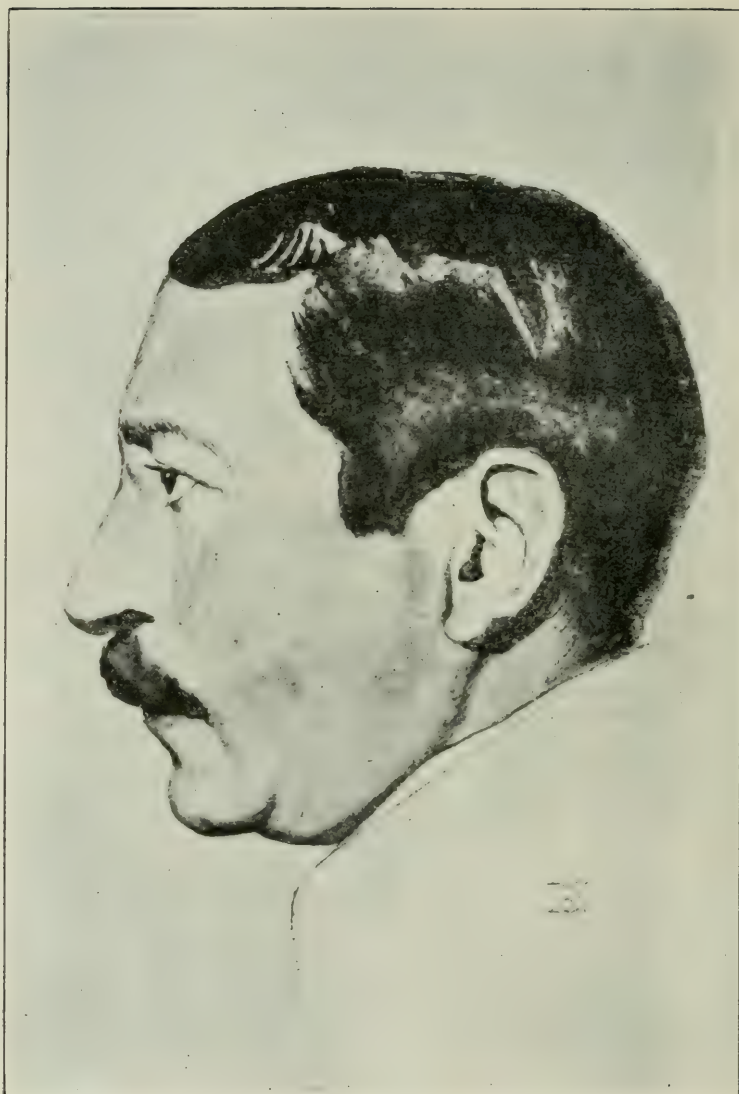


Figure 8. Profile view after permanent cure.

of the septum and a few fibrous synechia; the bony bridge of the nose was absent and there was quite a deep saddle-shaped hollow present. April 17, 1916, nasal osteoplasty was performed. A triangular strip of bone from the crest of the left tibia about 4 cm. was inserted, after it had been trimmed above and below, into an incision made in the upper part of the root of the nose, so as to make a new bridge for the nose. When the strip had been introduced the nose was raised up from the root to its lower extremity. Then the wound was sutured.

The patient did not spit up any blood or blow any out through the nose which showed that the mucous membrane was not injured.

June 14, 1916. As the right nasal chamber was still obstructed by the dislocated septum the air did not pass through this opening. The left nasal chamber, on the other hand, was larger in spite of the presence of a little synechia from the turbinate to the septum (middle portion). Further, a small perforation was visible through the left nasal chamber. The cartilage of the dislocated septum was resected with a knife in the right nasal fossa. In this way, the perforation was enlarged. The end of the corresponding turbinate was resected with forceps and finally the operator destroyed the fibrous bridge in the opposite nostril.

August 24, 1916, the patient was transferred to the ophthalmologic section. He has been accepted as fit for service.

Comment.—The figures accompanying this observation show much better than a close description could by what series of operations the result sought was secured.

Facts of this kind are evidently numerous but nevertheless they deserve to have themselves added to those already known and often described in the work to which reference was made at the beginning of this article. They well prove that individual initiative ought still at the present time to add to the classical descriptions, for a projectile or at least certain projectiles may make mutilations which could not have been anticipated in advance; it is therefore impossible to establish a fixed rule which must be followed and a chosen method which is best to apply as each case will have its own general as well as special indications.

WOUNDS OF THE FACE AND MAXILLARY BONES.*

BY PROF. E. J. MOURE,

BORDEAUX.

During this terrible war through which we are passing the face has been injured by all kinds of projectiles, which have penetrated or mutilated it in all its constituent parts. Warfare of trenches and field fortifications has especially favored the wounds of this region. We have seen wounds of the upper or lower jaw which have been perforated in one direction or another, without leaving any great disfigurement. On the other hand the wounds of the face due to shell fragments or explosive balls have generally resulted in much greater mutilations.

Thus in some the upper or lower jaw has been injured; in others both at the same time have been more or less abraded, fractured or carried away. The most horrible wounds have been observed, especially when they involve the lower part of the neck, the esophagus and the pharynx; sometimes with fatal results; but more frequently it should be said, the wounded have resisted these injuries and it was possible to transport them to the rear where they came under our care.

We pass over the small perforating wounds, or the slight injuries of the face, and report here simply two cases of extensive loss of substance, compelling us to perform more or less complicated and delicate plastic operations.

In these cases of mutilating wounds of the face as in extensive wounds of the limbs or any part of the body the important question to decide is whether to undertake immediate closure or to perform a secondary flap operation at a later period. It is quite certain that very vascular tissues of the face show considerable vitality and are therefore well nour-

*Translation made in the office of the Surgeon-General of the Army from the original which was published in *La Restauration Maxillo-faciale*.

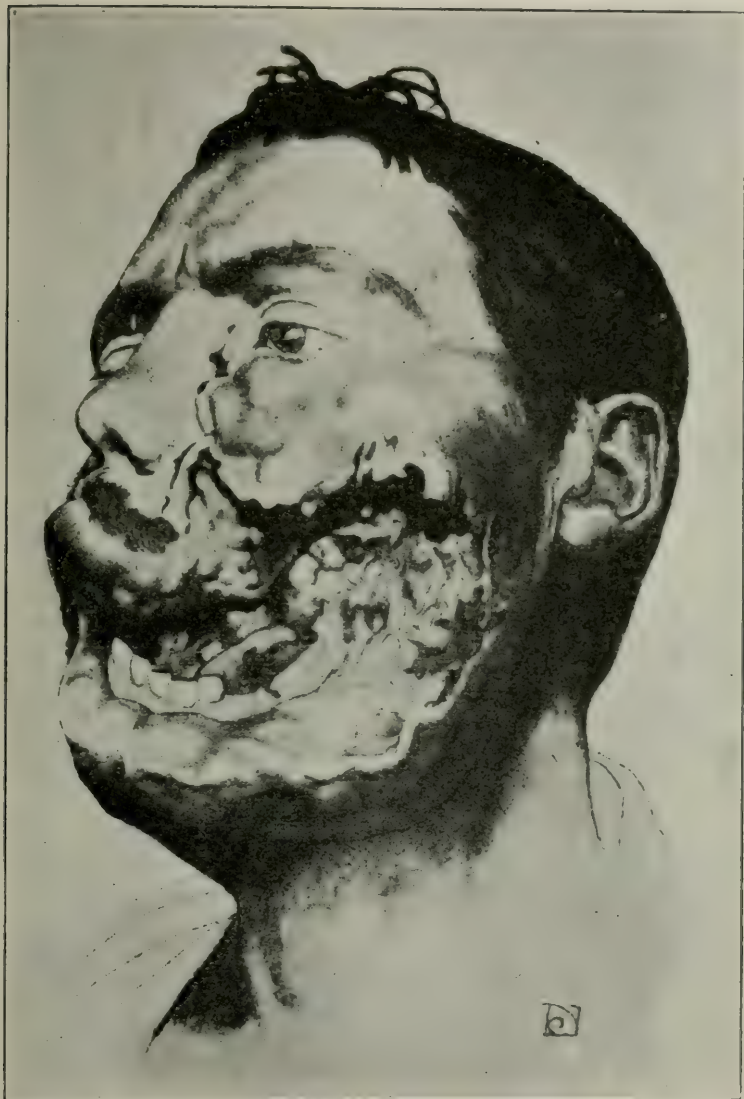


Figure 1. Condition of the wounded at the time he was injured by the projectile (explosive ball, he says). The tissues of the left cheek are horribly torn and carried away. The two maxillaries have been broken up and partly destroyed, several teeth broken out and carried away.

ished. An attempt may be made in many cases, after thorough cleaning, to bring together the parts separated by the projectile, or at least to approximate them to a certain extent, in order to obtain a partial restoration and ultimately to favor a definite plastic operation.

In principle we should be careful to conserve apparently mangled or badly detached pieces of tissue for such a strip, useless at first sight, may, when cicatrization is complete, serve to restore a portion of the face. It is only when the tissues are mashed, abraded and mangled by the projectile and therefore liable to necrose that we are justified in cutting out portions or entirely removing them in order to bring the bony framework or more often the soft parts together.

Unfortunately these immediate reparative methods are not always done with an esthetic taste. Thus I have seen eyelids sutured vertically, torn lips placed far from their normal position, when it seemed a simple matter either to leave them in their place or at least to bring them as near as possible to their usual situation. In most cases, the surgeons content themselves, as soon as the initial hemorrhage is stopped and the wound cleaned, with sending the patient to an evacuation hospital, where they almost always try a secondary repair operation, which fortunately in a good number of cases is possible.

In the beginning of the war we saw a considerable number of cases of this type which could be operated upon with success at home. For many months past, we have seen only men with mutilated faces who have passed through several hospitals and who were finally sent to us that we might make them a more or less esthetic face.

In such cases we must, as Morestin said in a recent communication to the Academy of Medicine, arm ourselves with much patience and not be afraid to make, at considerable intervals, a series of plastics on the same patient which will gradually enable the mutilated face to take on an appearance which approaches the normal as much as possible.

Operative procedures.—The operative methods are as varied as the wounds and mutilations and it is therefore impossible to describe them. The circumstances and the special features of the cases oppose any definite rules.

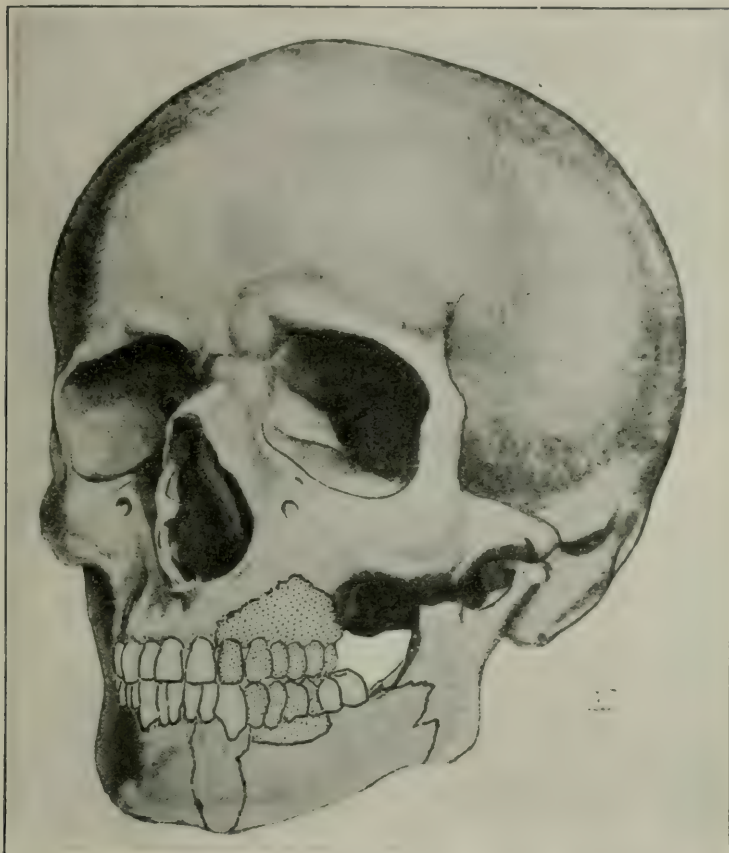


Figure 2. This figure shows the bony portions of the inferior maxillary destroyed by the projectile. They are indicated by a dotted area. This reproduction of an X-ray picture shows the lines of vertical fracture which occurred on the horizontal ramus of the lower jaw, one at the junction with the ascending ramus and the other a little external to the symphysis menti.

Indeed, it is, as Morestin said, a true game of patience (*jeu de patience*) to bring together parts which have been separated and which are often incomplete in order to succeed in reconstructing a face with a human semblance and to prevent the unfortunate from becoming an object of horror to his fellowmen.

Most frequently it is not sufficient to repair the facial covering. We must also realign or replace the bone which has been destroyed by use of a more or less ingenious prosthetic apparatus. Sometimes it is a lower jaw whose fragments must be kept in place in order to permit the fractured fragments to consolidate or the bone to regenerate so that a pseudoarthrosis, always harassing to the patient, is avoided.

In this case, the intimate collaboration of the surgeon who performs the plastic operation on the face and of the prosthetic stomatologist must completely harmonize if we wish to obtain the maximum results.

We report here the cases of two patients, one wounded on the cheek in whom the lower jaw was fractured while at the same time the upper jaw was partly destroyed at the level of the alveolar border. Figures 1 and 2 show the condition of the wounded man at the time he was injured.

In the first figure we see the wound still gaping, extremely mangled, contused and horribly mutilated. The gaps in the bony framework are shown as a dotted area on the lower jaw and on the alveolar border at the level of the left molar.

An attempt to bring the lacerated parts together was made at the front. This was not without value, for later when the fractured jaw had consolidated, it made it possible to make sufficient repairs so that the patient was able to leave the hospital with a mere streak of cicatricial tissue indicating the borders of the cheek. A prosthetic apparatus replaces the defective portions of the hard palate and maxilla.

The history of this patient is as follows:

Case 1.—Cesar M., soldier, thirty-five years old, of the Nineteenth Infantry.

Wounded Nov. 6, 1914, at Dixmude by an explosive ball; extensive gap on the left side destroying the cheek, the labial region and the left half of the tongue. He was brought to the Otorhinolaryngologic hospital of the eighteenth region

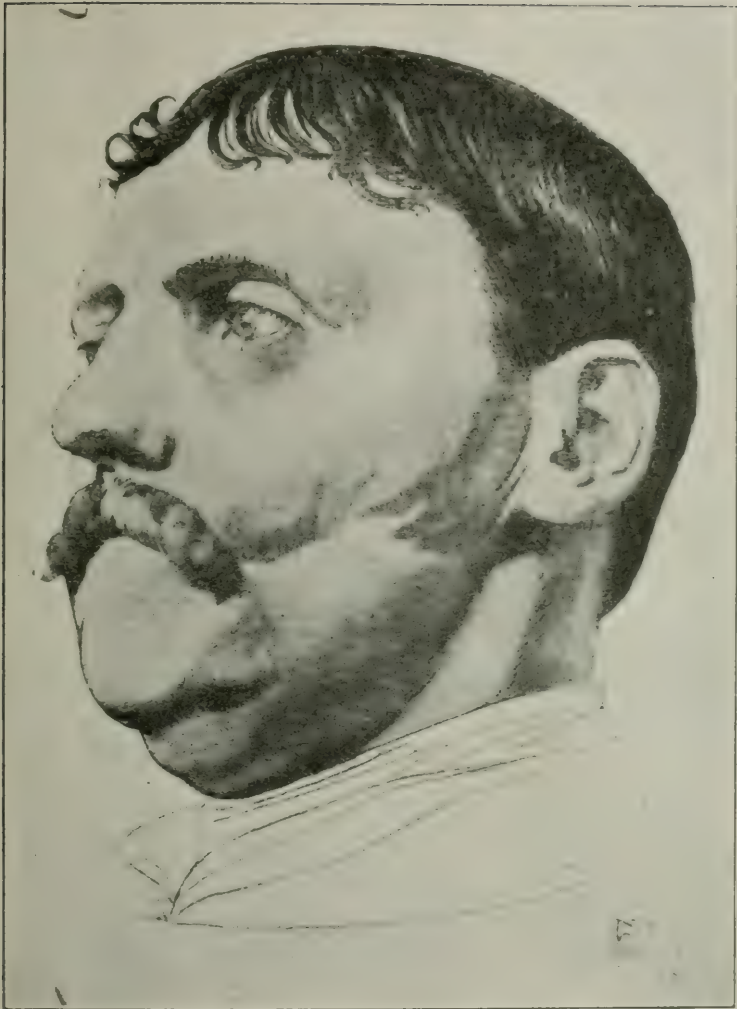


Figure 3. Shows the same patient at the time he left the hospital. Not only are the gaps in the soft parts filled out, but the patient, provided with a prosthetic apparatus for replacing the teeth carried away by the projectile, can easily open his mouth and masticate.

(Subsidiary Hospital No. 25), Nov. 13, 1914, coming from the Marine Hospital at Brest. Compound fracture of both maxillary bones badly infected.

Nov. 25, 1914. Plastic operation, first stage (Prof. Moure). Removal of free bone splinters. Disinfection of mouth. Reconstruction of cheek and labial region.

Dec. 16. Second stage. Completing the reconstruction of cheek.

Jan. 4, 1915. The gap is closed, the mouth reconstructed, the plastic and functional aim accomplished. The lower jaw whose arch has been scrupulously preserved, alone remains to be treated.

Feb. 13. The patient shows slight facial paralysis. There is a small fistulous tract in the malar region, in the middle portion of the cheek as well as in the region of the chin (right side).

Feb. 23. Curettage of both tracts. In the lower some bone splinters are found; cleansing with zinc chlorid and bandage. In the upper tract there were no bone splinters, but some pus below the eye; zinc. chlorid.

March 15. Incision on the left side from the labial commissure into the old cicatrix. Upper gum as well as labial commissure repaired.

April 25. Suture of lip gives way.

May 3. Plastic repair of the upper left gingivolabial groove and left buccal commissure. (Prof. Moure.)

May 18. Sent to a convalescent hospital. Returned June 25.

July 1. Plastic repair of the left labial commissure. (Prof. Moure.) The mouth is enlarged, a portion of the alveolar border is repaired and cicatricial bands which prevent complete opening are cut.

Aug. 5. Plastic operation repairing left gingival margin. (Prof. Moure.) A strip of gauze is introduced between the gingival border and the cheek from the lateral incisors to the extremity of upper maxillary border. The gingival flap is turned back on itself and retained by U-shaped sutures.

Aug. 11. It is found that the sutures have given way.

Sept. 9. Gingivoplasty. (Prof. Moure.) Incision of the cicatricial tissue on the left alveolar border, the cheek is sep-

arated from the bony wall and the cavity filled with iodoform gauze.

Oct. 22. Patient is transferred to the division of stomatology. A prosthetic apparatus is applied.

He opens the mouth well, having only one cicatricial band at the lower vestibule (gingivolabial furrow) which had to be cut in order to apply the dental apparatus.

Case II.—The other patient whose case we report here was much more seriously wounded.

He entered our hospital a very few days after he was wounded, in such a condition that we had first to remove the free splinters and disinfect the wound cavity. As can be seen in the accompanying figure the whole anterior portion of the upper jaw, the hard palate and the dental arch had been torn away by the projectile. The mouth, horribly mutilated, formed merely a large crater communicating with the nasal fossæ. The orbital cavity was not completely emptied but the eyeball was severely injured and formed a rather shapeless stump without value for vision. The lower eyelid was badly mutilated.

After having employed a few days in disinfecting the wound and obtaining cicatrization of the margins of the wound cavity, I performed the first operation, in which I confined myself to closing the cheek opening by freshening up the margins of the wound without concerning myself with the esthetic aspect of the face.

At a second operation I tried to reconstruct the lip and to put the mouth in its place. The eyelid was repaired and the mouth was somewhat shaped at a third operation.

My colleague Lagrange, to whom I afterwards sent this patient, performed enucleation of the left eye and replaced it by a glass eye.

The patient, Corporal T., twenty-seven years old, was wounded Oct. 31, 1914, at Ypres by a shell fragment striking the left side of his face. The patient was brought to the otorhinolaryngologic service of the eighteenth region, Jan. 10, 1915, coming from the Marine Hospital at Cherbourg.

Examination: The patient was hit by a shell fragment in the region of the left canine fossa. There was a wide opening from the orbital margin to the superior dental arch, including

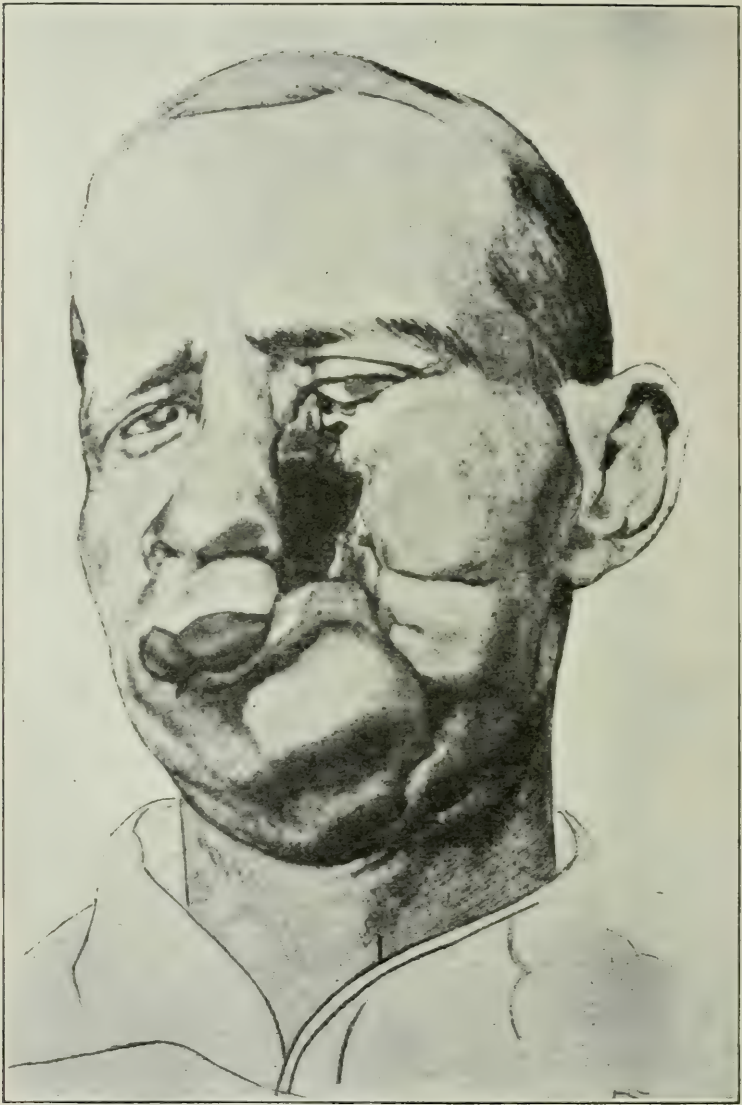


Figure 4. Severe mutilation of the face by a shell fragment. The left superior maxilla has to a great extent been destroyed by the projectile, which also carried away a large portion of the hard palate, opened the nasal fossae, fractured the lower jaw, injured the orbit and partly emptied the eyeball by carrying away the lower lid.

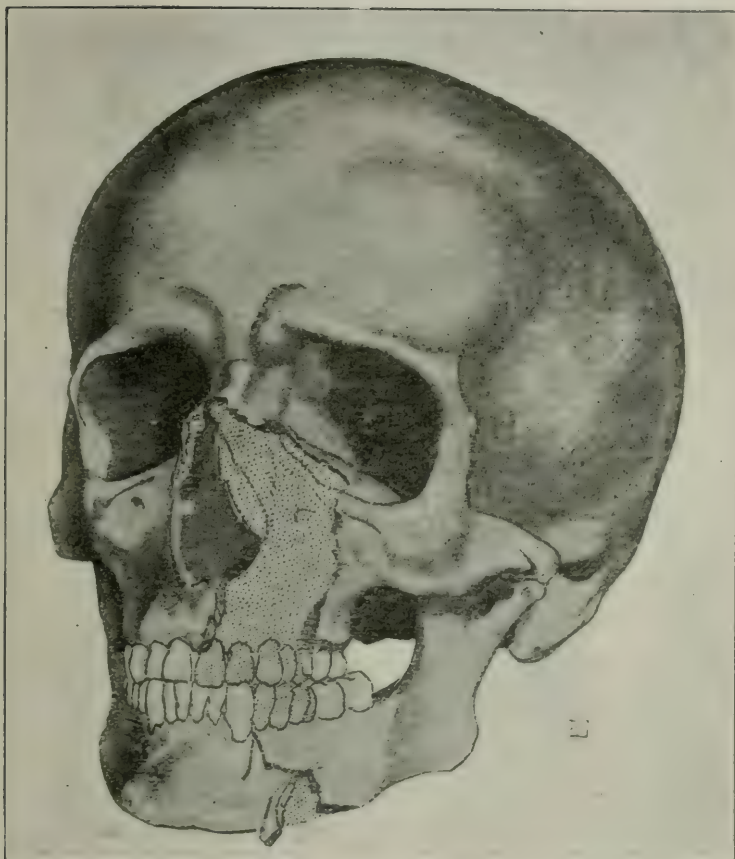


Figure 5. Shows the bone defect and the line of fracture on the horizontal ramus of the lower jaw. This figure, made from an X-ray picture by Prof. Bergonié, indicates the importance of the skeletal lesions clearly. There is almost complete destruction of the bone mass of the upper jaw, indicated on the figure by the dotted area; the nasal bones proper have also been broken and carried away.

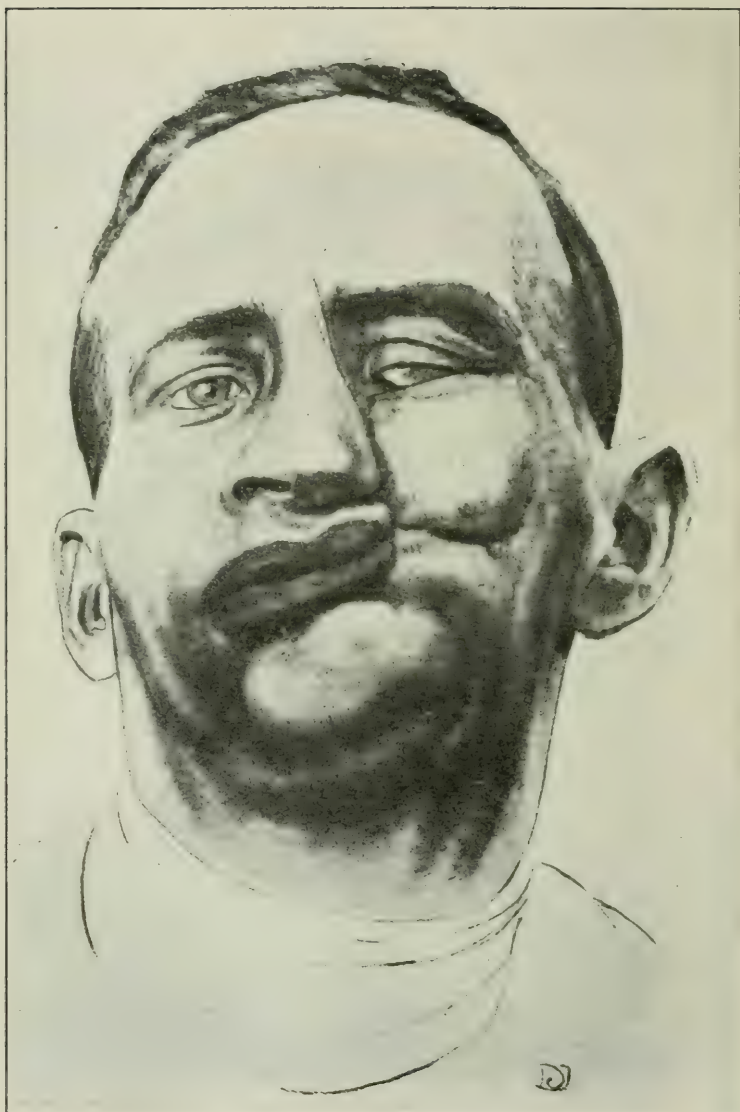


Figure 6. After closure of the bone gap by bringing the soft parts together. The upper lip still deviates very much, and the mouth is therefore markedly drawn upward on the left side. The object of this operation was only to close the wide hole which gave this unfortunate man a horrible appearance.



Figure 7. A few months later. The mouth has been reconstructed by means of a triangular flap, raised from below in order to reconstruct the upper lip. In a series of intermediary operations the buccal cavity was restored, the gap in the hard palate was filled with fibrous tissue in such manner that separation of the mouth from the nasal fossae was brought about. The labial commissure was restored and the tongue separated from the floor of the mouth.

the corresponding portion of the hard palate. Thus there was an extensive quadrilateral opening its inner border following vertically the nasofacial groove from the orbital border downward and passing to the inner side of the malar bone and reaching the first upper molar. The alveolar process could be seen projected to the floor of the cavity, the molars remaining attached but turned around so that their posterior surface looked forward. The hard palate was torn away to the border of the soft palate which was preserved.

The cartilaginous and osseous nasal septum had been carried away as well as the anterior two-thirds of the right lower turbinate. There was even a communication between the lower meatus and the right maxillary sinus. The right lower eyelid had been partly destroyed and the conjunctiva formed an ectropion triangular in shape. Externally the patient presented a large cicatrix starting from the left labial commissure and passing to the level of the hyoid bone where there were fistulous tracts with raised orificial margins. The upper lip, being cut, has partly grown to the wall of the canine opening, the remainder being very much swollen and forming a large bulging above the lower lip. Left eye was gone.

Jan. 11. X-ray picture shows fracture of the upper jaw, fracture of hard palate, penetration of a tooth into the maxillary sinus, fracture of lower jaw.

Jan. 16. Removal of small bone splinters.

Jan. 18. Incision under chloroform at the pomum adami. Several bone splinters are removed. Iodoform gauze; suture. Two teeth which have been forced with the left superior maxilla into the posterior portion were removed. The upper jaw cannot be brought forward. (Prof. Moure.)

Jan. 22. The wound is doing well and suppurates but little.

Feb. 22. Plastic operation of the face. (Prof. Moure.) The cheek is freed and the loss of substance overcome by suturing it to the nose. The left nasal orifice and the buccal commissure are reconstructed.

March 17. Patient is sent to a convalescent hospital. Returned April 20.

April 26. Redness of the swelling in left suborbital region. Ichthyol ointment.

May 6. Another operation. (Prof. Moure.) Half of

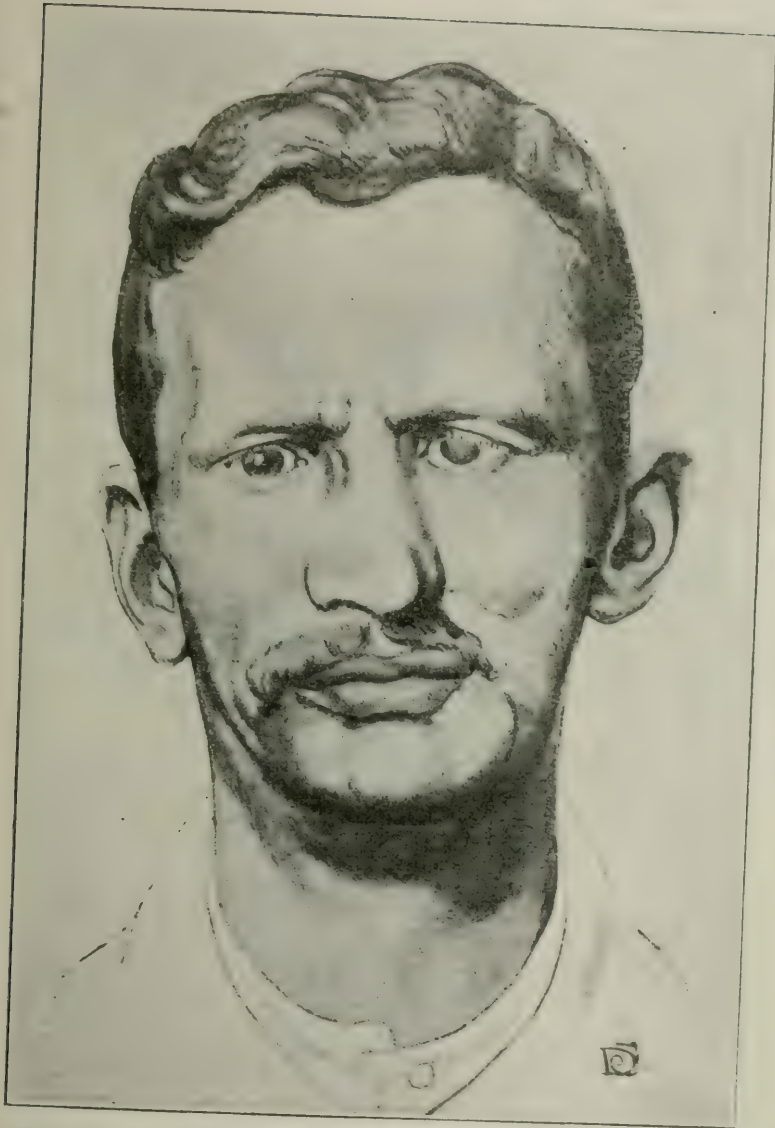


Figure 8. This figure shows the man at the time he was transferred from my service to that of Dr. Lagrange (ophthalmology) for the enucleation of the left eyeball, partly emptied by the projectile, and for an ocular prosthesis. The stomatologic service also made a prosthetic apparatus for him to replace the teeth which were wanting. Dilating exercises succeeded in producing a buccal opening sufficient to enable him to easily feed himself.

the upper lip is reconstructed by means of a flap taken from the scar of the lower lip.

May 26. Separating of the jaws is begun.

Oct. 9. Facial plastic (Prof. Moure). The mouth is enlarged on the left side in order to enable the dentist to take an impression.

Feb. 16, 1916. Another plastic operation (Prof. Moure). The cheek scar is reopened in order to pad and to raise it.

June 24. Plastic of the face (Prof. Moure). Lateral incision starting from the left labial commissure in such a manner as to remove the cicatricial tissue on the inner surface of the cheek and of the lip. It is also found that the whole old cavity is filled with fibrous tissue.

The labial commissure is incised by separating the fibrous tissue adhering to the maxilla from the mucous membrane of the cheek. A portion of this very dense cicatricial tissue is removed in order to make the wall thinner and to suture the mucous membrane at the level of the commissure. The mouth can thus be opened halfway, which makes it possible to insert on the right a dilating apparatus which is left in place.

March 31, 1916. The tongue is freed from adhesions on the left side, and two separate levels are found, a lingual one and the other on the floor of the mouth.

For several months I have not seen this man who later was fitted an artificial hard palate and artificial teeth.

We have here a very serious traumatism, very mutilating wounds affecting the soft parts and the bony framework of the face which was, however, reconstructed in a very decent way so that the unfortunate man is not an object of horror as he was before.

Many other such cases could be mentioned. They are now well known to the medical profession since there are in France several colleagues who make a specialty of these reconstructions and obtain truly interesting successes in apparently hopeless cases.

We must, however, remember that the role of the surgeon is not only to reconstruct the facial outlines of the patients but also to maintain or even to reconstruct the patency of the orifices or of the natural channels which are often narrowed or closed by the wound.

We should also note that very often a facial wound well attended to, cicatrizes of itself under truly extraordinary conditions in such a manner that it is well, as I have said before, to attempt to bring together as soon as possible, the mutilated or displaced parts. On the other hand, however, we must not be too hasty in making too early a reconstruction, for nature sometimes brings us surprises even in apparently very serious cases.

Furthermore, if after an operation a badly cicatrized wound becomes badly keloidal, we must not hesitate to remove this new-formed tissue, which is almost always dense and retracted and which may prevent a satisfactory facial plastic. We should not forget that the skin has the advantage of being very elastic and of lending itself to sliding plastics if we know how to make use of it.

One of my assistants and co-worker (Dr. Pietri) will later publish a plastic method which I have used from the beginning of the war, and which has given perfect results without the necessity of borrowing new tissue from the neighboring soft parts, from the thigh or buttocks, in order to graft it upon a defective cicatrix.

We should not forget the good effects of massage under hot air, ionization, or even X-rays in order to render certain dense and adherent cicatrices pliable.

I mention once more the good influence of the iodid and even biniodid treatment in certain cases where the tissue is of such a poor character that repair is slow and poor.

LXXII.

TREATMENT OF THE MOST COMMON MUTILATIONS OF THE NASAL TIP STRUCTURES (AUVENT NASAL), CAUSED BY WAR TRAUMATISM.*

BY HENRI CABOCHE,

MAXILLOFACIAL SERVICE OF DR. PIENE SEBILEAU,
HOPITAL CHAPTAL.

It is proposed in this study to complete and enlarge upon the communication made several months ago, before the Société de Chirurgie, in collaboration with Dr. Sebileau (Bull. et mem. Soc. chi. de Par., March 20, 1917), who has entrusted to us the surgery of this region in his service at Chaptal Hospital.

"The 'auvent nasal,' as we stated in that paper, "is that supple and mobile cartilaginous portion of the nose which borders the frontal processes of the maxillæ and the nasal bones proper, which supports the anterior and inferior borders of the quadrangular cartilage (septum and columella), just as the ridge piece sustains the roof, beneath which the nasal orifices pass in, and whose two wings unite below and in front to join the lobule." Its lesions are among the most important of the nasal pyramid. They are also very varied.

Classification.—Destruction of the "auvent nasal" may be total or partial.

In total destruction, the lobule of the nose, the cartilaginous septum with most of the columella and the alæ, have disappeared. Hence, all of the nasal pyramid situated below the bones proper is level with the submalar plane. The remains of the alæ and columella, contracted by cicatrization, become attached, the first more or less obliquely to the circumference of the pyriform orifice, the second to the anterior border of the septum, which appears in the form of a ridge extend-

*Translation made in the office of the Surgeon-General of the Army from the original which was published in *La Restauration Maxillo-faciale*.

ing vertically between the bones proper and the anterior portion of the floor of the nasal fossa. The mutilation reproduces the picture of the nasal skeleton, the flat nose (Fig. 1). There is a form of total destruction (extremely important, because it necessitates, as we shall see, a special treatment) in which, contrary to the description just given, the cutaneous columella has entirely disappeared. This form includes a more extensive destruction of the septum in the frontal plane; its vertical ridge appears more deeply buried in the interior

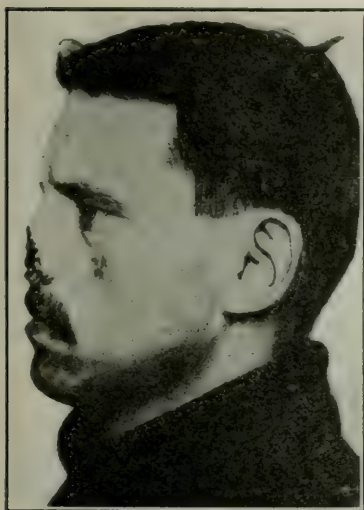


Fig. 1. Soldier Por.



Fig. 2. Soldier J.

of the nasal fossæ, its insertion is more remote from the anterior portion of the floor; finally, the cartilaginous element which enters into its construction is very much reduced in proportion to the bony element, which exists only in the anterior portion (Fig. 2).

PARTIAL DESTRUCTION.

Partial destruction may be divided into four principal types:

1. Destruction and flattennig of the dorsum of the nose with displacement of direction of the vestibule. The destruction

has chiefly involved the middle portion of the "auvent" (between what might be called its substructure and the nasal bones). The anterior part of the quadrangular cartilage is destroyed as in total destruction and its border becomes vertical. In its lower portion (columella, alæ and lobule) it has simply been torn from its deep attachments. Drawn upward and backward by the cicatrization, in the frontal plane, it is placed in such a manner that the nostrils no longer face downward but directly forward. It is rare, however, for the destruction to be so schematically regular.

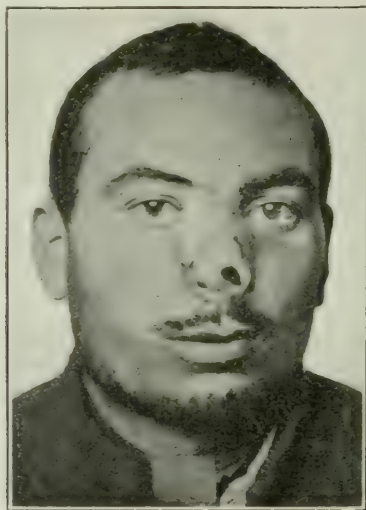


Fig. 3. Soldier Pill.

Frequently one of the nostrils is entirely preserved with the lobule intact, while the other is sectioned and more or less destroyed. The lumen of the preserved nostril does not face directly forward, but forward and laterally, the lobule covering more or less the nostril of the opposite side, already contracted by a vicious adhesion of the sectioned ala. (Fig. 3, 4, 5, 6.)

2. Destruction of one ala of the nose. Lobule and columella are preserved. In a few cases, which appear to us excep-

tional, the ala has been completely destroyed. At present we are not concerned with the variety. Generally a rudiment of ala exists near the nasobuccal furrow. (Fig. 7, 8, 9.)

3. False direction of an ala.—Septum, columella and ala are preserved in their form. But the lesion has affected the "auvent" outside the median line, above the ala, and by the cicatricial retraction the ala has sustained a more or less considerable upward movement, exposing the vestibular septum. (Fig. 10, 11.)

4. Isolated Destruction of the Columella.—This form rarely



Fig. 4. Soldier Pill.



Fig. 5. Soldier Pr.

presents itself, according to our observation. This lesion is generally the upward extension of a destruction of the upper lip. The treatment of this will not be considered at present.

Is there need to say that this classification is of necessity schematic and is intended in no way to comprise the entire scale of lesions which may be brought about by war traumas?

TOTAL DESTRUCTION.

The reconstruction of a nasal "auvent" comprises the two following operations: (1) Creation of a nasal ridge and col-

umella; (2) application, on this support, of a layer of cutaneous covering. This is the procedure that we have devised, as described in the paper before the Société de Chirurgie previously mentioned.

1. CREATION OF A NASAL RIDGE AND COLUMELLA.

It has appeared to us simple to find the tissues necessary in the remaining portion of the nasal septum, even when the latter is buried in the interior of the nasal fossæ. For this purpose we cut from the septum a large flap having the form of a right angled

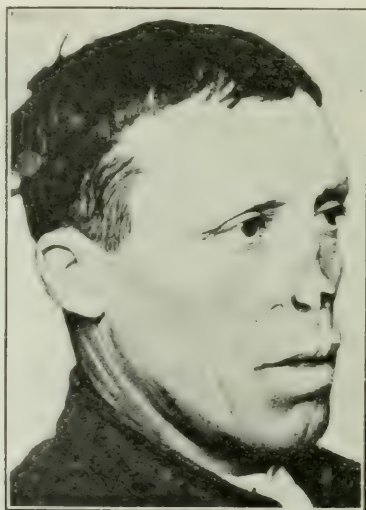


Fig. 6. Soldier Pr.

triangle. The longer side of the triangle corresponds to the insertion of the septum on the nasal floor; it is therefore inferior. The shorter side is the free border of the partially destroyed septum, and is therefore anterior. The hypotenuse extends approximately from the point where the septum is inserted between the two nasal bones proper, as far as the floor of the nose, where it joins the longer side of the triangle; it is therefore superior. The three angles of this triangle are consequently anteroinferior, anterosuperior and postero-inferior. However, the anteroinferior angle does not come in the same vertical line as the anterosuperior angle, and re-

mains on a posterior plane; in fact, in cutting the large side of the rectangle one should stop the section of the septum before reaching the anterior border of the latter, stopping at a point about a half centimeter from the edge of the cartilage. This half centimeter forms a sort of hinge pedicle around which the flap is made to swing in the sagittal plane in such a manner that:

- a. The long inferior side becomes posterior;
- b. The short anterior side becomes inferior and forms the columella;



Fig. 7. Soldier E.

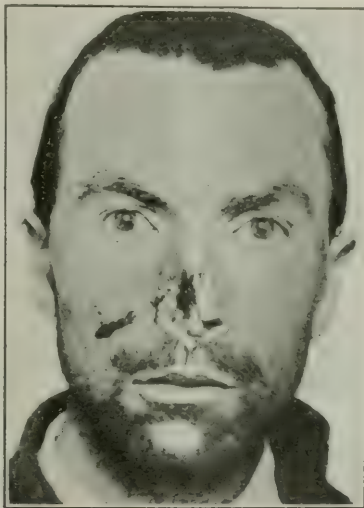


Fig. 8. Soldier C.

- c. The hypothernose above becomes anterior and forms the dorsal ridge of the nose.

In this way there is constituted a sort of support whose posterior angle, now superior, insinuates itself on the nasal bones proper, to the periosteum to which it is fixed by a few catgut sutures. (Fig. 12, 13.)

The cutting of this support is delicate; it is facilitated by the instruments which we employ. The septotome which we have had made (Caboche) is a sort of fine lanceolated bill-hook, whose long and stout handle is provided with a heel,

and whose thin blade presents a keen point and two concave and opposed edges. (Fig. 14.)

The point of the instrument punctures the anterior segment of the cartilaginous septum, slightly behind the future pedicle. It is pushed from before backward, keeping close to the nasal floor, until a resistance, not to be mistaken, indicates that the anterior border of the vomer is reached. A few blows with the palm of the hand on the heel of the handle permit the detachment of the vomer to a sufficient extent. The section

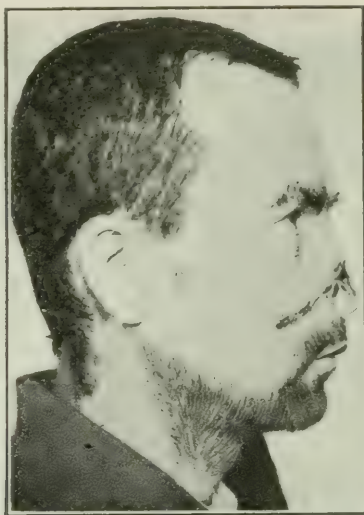


Fig. 9. Soldier C.

of the hypothermose, which ought to fall at 45 degrees on the floor of the nasal fossa, is made preferably from behind forward, either with the bistoury, with simple scissors, or with the excision forceps of Mahu mounted on the universal handle of Bruneau.

2. THE APPLICATION OF A CUTANEOUS COVERING.

Over the cartilaginous support, and intended to be supported by it, we apply then two lateral, symmetrical, rectangular flaps, cut in the cheek obliquely downward and outwardly, whose pedicle, internal and above, is situated more or less near to the

orbitonasal angle, according to needs. These flaps, which are provided with a good vasculocellular base, have excellent vitality; they are of reducible thickness, which gives much elasticity to the operative technic; finally, they are moldable and plastic. We suture them to one another in the median line by their inner borders; by their outer borders they are united to the remains of the wings of the nose previously liberated and brought into good position. On their deep surface they are applied to the reconstructed septum and are inserted between



Fig. 10. Soldier P.

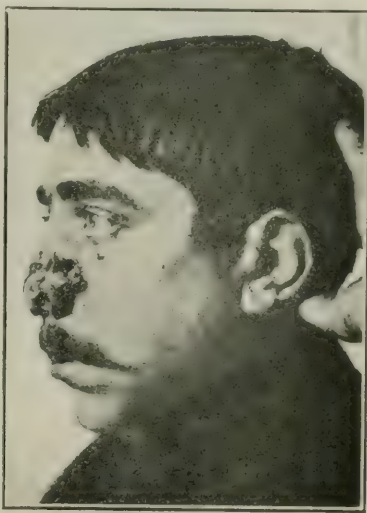


Fig. 11. Soldier P.

the edges of the depression made for them by the liberation of the remains of the lateral cartilage of the nose and resection of scar tissue. By their free inferior border the flaps are called upon to restore the lower contour of the vestibule of the nose in conjunction with the remains of the alæ (Figures 15, 16, 17). Above they are left all their thickness, so far at least as this allows making them even with the neighboring cutaneous plane. (This leveling is of primary importance for the esthetic appearance of the future nose; we do not hesitate to sacrifice deliberately from each side a part of the healthy cutaneous flap when without this excision the flap

would superimpose at the point of crossing the upper part of the pyramid to meet its fellow in the median line. We thus create a depression in which the flap is inlaid and thanks to which no inequality of surface of our reconstructed nose exists. Figure 16 shows to the left this gutter in dotted lines; to the right the excision has been performed.



Fig. 12.

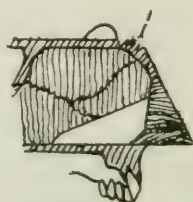


Fig. 13.



Fig. 14.

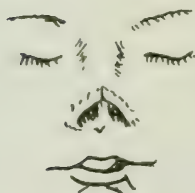


Fig. 15.

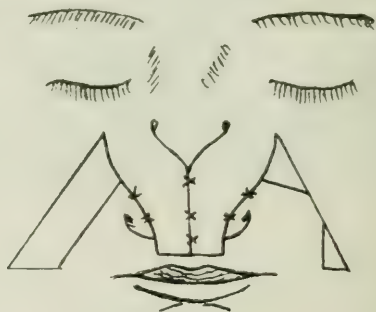


Fig. 17.

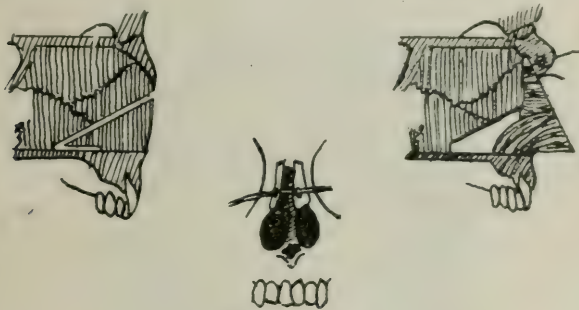


Fig. 16.

Below, we slightly thin out the flaps in such a way that they may, in being turned, form of themselves a sort of seam limiting the border of the nose. It is here that normally retraction takes place. It is here only, at this lower border, that the vitality of the graft sometimes is questionable, so that we take

the precaution to leave this end of the flap free and floating for the first day or two, placing no suture, no retention and no doubling over; not even a drain or gauze wick in the nasal fossa, which would compress the flaps by raising them up. We used this method successfully in the soldier Por. (Fig. 1, 36, 37, 38.)

The preceding technic assumes that the traumatism has respected the quadrangular cartilage near the root of the columella in sufficient quantity to allow its incision for the forma



Figs. 18, 19, 20.



Fig. 21.



Fig. 22.

tion of the hinged pedicle of which we have spoken. The most favorable conditions are realized when a portion of the cutaneous columella persists and brings to the pedicle its nutrition through the artery of the columella.

In less favorable cases, which we mentioned in the classification, where the columella has entirely disappeared and the lower part of the cartilage is totally destroyed, the large base of the septal flap must be entirely composed of the vomer. Under these conditions, in order that the swinging of the flap

may be possible, it is necessary that the vomer be detached from the floor of the nasal fossa to its origin at the nasal spine; but then our flap would not keep any attachment to the floor and would become free.

We then operate in the following manner: At the anterior and inferior portion of the septum we detach on both sides the mucous membrane which covers it over an area of about one centimeter, and we extend on each side the detachment on the floor of the nasal fossa, outward as far as possible to-



Fig. 23. Soldier Pill.

ward the inferior meatus. Incising then each of the two mucous flaps thus obtained at the end of their zone of adhesion (vertically near the septum, horizontally and transversely on the floor) we thus form, artificially in a way, a mucous pedicle formed of two bilateral flaps extending from the inferior meatus to the anterior portion of the vomer, a pedicle which will bring to the segment the vascular elements necessary for its nutrition, and which will allow it later to swing between its two constituent flaps. (Fig. 18.)

The resection of the vomer is made with the electric or dental engine in the region corresponding to the pedicle (sub-

mucous resection) to avoid the cracks made by the chisel. In the remainder of its extent the resection is performed with the engine if possible; if not, by the septotome handled like a chisel, great care being taken to keep the mucous membrane belonging to it adherent to its two surfaces (transfixion). The hypothenuse is sectioned as previously described.

The flap being swung and put in good position, there still remains its fixation. While in favorable cases, where one has been able to form a chondromucous pedicle, simple suture of



Fig. 24. Soldier Pill.

the top of the flap to the periosteum of the nasal bones proper suffices for this purpose (besides its nutrient rôle, the hinged pedicle, by its continuity with the substance of the flap and by its elasticity which tends to carry it backward and to buttress in a way the flap on the nasal bones proper, plays a most essential rôle of retention). This does not apply in cases where one has had to rely on the mucous pedicle, whose rôle is purely nutrient. In this case we fix the top of the septal triangle between the two previously dislocated nasal bones.

By means of a bone forceps, each of the nasal bones is dislocated outwards. Having thus opened them like a book, we

introduce the upper end of the flap in the interval between them, and we pass from side to side a catgut suture through the nasal bones and the flap, which have been previously perforated with an engine bur. The nasal bones are pressed down in the median line before the catgut is tied over them.

Nothing remains but to apply to the support, thus set in place, the cutaneous covering made from the two flaps, which we have just described. This technic has been utilized twice successfully. The patients are still under treatment.

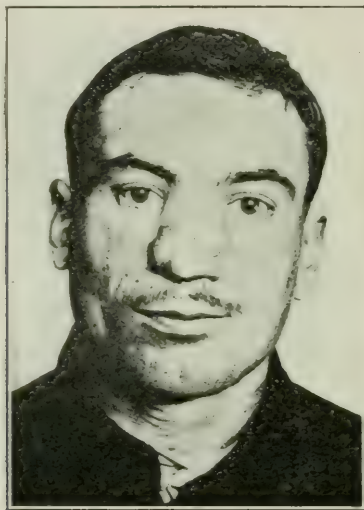


Fig. 25. Soldier Pill.

The operation whose different stages have just been described must only be undertaken after good assurance of the quality of the cartilaginous septum; it should not be attempted if the septum is soft in a large part of its extent, or if it is perforated, conditions which render impossible the formation of the flap. (This determination is sometimes difficult; a septum apparently healthy to rhinoscopy, on operation was found to be the seat of several abscesses, which were the cause of failure.)

The operation is not without difficulty. By reason of its hemorrhagic character from the necessity of resecting scar tis-

sue and attacking the very vascular nasal mucous membrane, blood flows abundantly into the nasal fossæ, making cricothyroid laryngotomy with anesthesia absolutely necessary.

It is unnecessary to say that before undertaking this cosmetic restoration, it is necessary, by treatment or by a preliminary operation, to reconstruct and assure the permeability of the nasal respiratory passage.

This method was employed in the case of the soldier Cor. As shown in Fig. 8 and 9, there was almost complete destruction of the right ala (with the exception of the lower portion of the root) and of the septal end of the left ala, which were in the most part preserved.

The right ala was repaired after the manner indicated. The left ala was lower after incision of the tissues which held it. The loss of substance resulting from this liberation was sup-



Fig. 26.



Fig. 27.

plied by a cheek flap, with orbitonasal pedicle, turned ninety degrees, and well applied after having deliberately sacrificed the skin of the bridge of the nose which, although healthy, opposed its perfect adaptation.

The esthetic result was very favorable. The sutures unhappily became the seat of a tuberculous process, particularly along the median line, where there was at the time of operation a small ulcer of the septum. In order not to favor the local process by diminution of the blood supply, we decided to postpone the section of the left flap (Fig. 28 and 29).

FLATTENING AND DESTRUCTION OF THE NOSE, WITH FALSE DIRECTION OF THE VESTIBULE.

The operation comprises the following stages:

1. Destruction of the scars and liberation of the remains of the ala of the nose and the lobule, in such a way as to be able to give each of these parts their natural position.

2. Creation of a nasal bridge by means of the septal flap previously described.

3. Application on this bridge of cheek flaps of shape and dimensions appropriate to the loss of substance resulting from the liberation performed in the first stage.

The case of Private P., shown in Figures 3 and 4, illustrates very well this type of deformity. Section of the septal flap was made, as in the cases of total destruction, with partial preservation of the columella—i. e., by transfixion. After

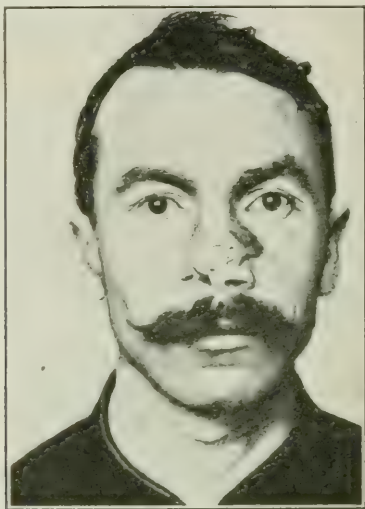


Fig. 28. Soldier C.

swinging the flap, its anterior border, now inferior, was applied to the fibrocuteaneous mass of the columella. As to the cheek flaps, they were cut with an orbitonasal pedicle as for total reconstruction (Figure 21), but their method of adaptation was necessarily different on the two sides.

On the left side, for the purpose of preserving the nostril and lobule, the flap was twisted almost 90 degrees. The end opposite to the pedicle (which might be called its base), instead of horizontal became vertical and was carried to the median line; the outer side, oblique below and outward, became horizontal and inferior, and was sutured to the upper

part of the left ala; the inner side became horizontal and superior and was sutured to the skin covering the nasal bones (Figure 22).

On the right there existed only a small portion of the root of the ala of the nose; the flap was simply swung around its pedicle, after the manner of a pendulum around its point of attachment. Its inner border, brought close to the median line, was sutured there to the base of the opposite flap above and with the left side of the lobule below. Its external border was

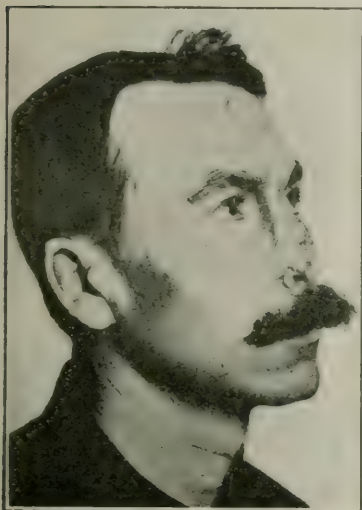


Fig. 29. Soldier C.



Fig. 30. Soldier E.

sutured to the remainder of the ala on the right side; and its length was trimmed so that its lower end extended appreciably below the lobule and the ala (Figures 21 and 22).

Several retouches were made to turn in this end and to fuse it with the neighboring parts internally and externally.

Aside from the keloid scars, which the patient already presented before the operation, and which it has not been possible for us to avoid, the esthetic result, as shown in the appended photographs, was satisfactory. The root of the nose remains broadened on account of the traumatic separation of the nasal bones (Figures 23, 24 and 25).

DESTRUCTION OF ONE ALA OF THE NOSE.

3. Destruction of One Ala of the Nose.—With the disappearance of one ala of the nose we seek, for its reconstruction, to utilize the cicatricial edge of the traumatic breach as free border of the future ala. We trace therefore a rectangular flap, with pedicle corresponding to the cheek, at the site of the nasofacial furrow. Of the three other sides of the flap, the inferior one corresponds to the cicatricial border of the loss of substance and extends from the lower part of the nasobuccal groove to the nasal bridge (it comprises generally a minute vestige of the root of the ala); the second, parallel to the preceding, extends from the upper end of the pedicle to



Figs. 31, 32, 33.

the nasal bridge, crossing a few millimeters below the infero-internal angle of the orbit; the third, vertical, joins on the bridge of the nose the two nasal ends of the preceding. This side does not exactly follow the nasal bridge; it extends a few millimeters beyond it.

This flap, dissected with its deepest layers, is then lowered by making it turn around its pedicle like a hinge, in such a way that its lower border has a direction symmetrical with that of the opposite ala. Its paramedian border is sutured from below upward to the lobule and the crest of the pyramid, its upper border is sutured to the periosteum of the free border of the nasal bone (the height of the flap has been calculated in such a way that after lowering it, this suture is possible); its lower border becomes the free border of the ala of the

nose. When the skin of the patient is thick and resistant, when the vestibular septum is not deviated, when, in a word, atelectasis of the flap or atresia of the nostril is not to be feared, this procedure suffices.

We used this method on the soldier E. (Fig. 7). The immediate result was excellent. A slight sphacelus of the nasal border of the flap resulted, the consequence of which was a slight ascension, with inequality of the new ala, as compared



Fig. 34. Soldier P.



Fig. 35. Soldier P.

with that of the opposite side. However, his condition was sensibly improved.

When, on the contrary, on account of the thinness of the skin, there is cause to fear aspiration of the flap when put in place, or when a deviation of the septum renders functional insufficiency of the newly formed nostril likely (as seen in Soldier E., Fig. 7), we introduce into the flap a fragment of cartilage which we cut if possible in the shape of a groove facing the vestibular cavity.

The flap is traced as previously described. At the moment when, in the dissection, the lower edge of the nasal bone is reached, we detach with a spatula the fibromucosa covering

the bone on its deep surface, and continuous below with that which covers the flap. This is then sectioned under the nasal bone as high up as possible.

When the dissection is completed, there is therefore obtained a rectangular flap covered on its deep surface with a fibromucous layer which extends beyond its upper border. The flap is split by cleaving from above downward a space between its tegumentary and fibromucous layers. There is thus obtained a sort of sac open above, the bottom of which is formed of



Fig. 36. Soldier P.

the lower edge of the flap, and in which the cartilage is placed. The sac is then closed by a few sutures at its upper portion; then the flap is sutured, as previously, on the inner side to the lobule and at the crest of the nasal pyramid, and above to the periosteum of the free border of the nasal bones.

THE DISORIENTATION OF THE ALA OF THE NOSE.

Figures 10 and 11 show the condition in Soldier Pou., some time after the wound, giving only an imperfect view of the lesion at the time of operation (through an oversight no photograph was made during the cicatricial period).

This was a case of marked ascent of the ala of the nose, its free border took the form of a curve with large radius, concave below and widely exposing the septum, the opening of the nostril directed in a very disfiguring way forward and outward. In this case again, the cheek flap easily corrected this deformity.

An incision is made following the scar, usually in a horizontal direction. This incision passes only to the fibromucous layer. A division is then made above and below the incision.

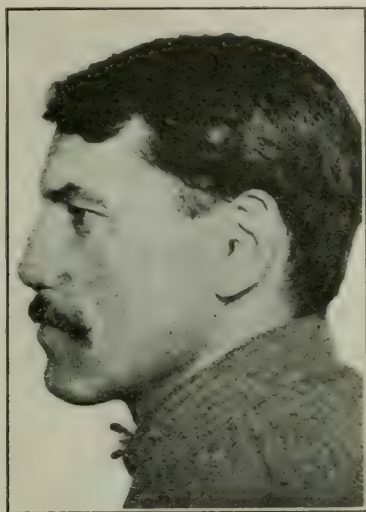


Fig. 37. Soldier P.

between the cutaneous and the fibrous layers, which is carried as far as the edge of the nostril and above to just beneath the nasal bone. In sectioning the fibromucous layer, following a horizontal direction, as high as possible underneath the nasal bone, there is obtained, as before, a flap entirely fibromucous at its upper part, fibrocutaneous at the site of the ala, and thanks to which this latter is lowered and placed easily in good position, the upper fibromucous edge of the flap. In suturing to the upper cutaneous border which results from this liberation of the ala, there is obtained for the covering flap which we next apply, a sort of bed, whose lower border

corresponds to the upper border of the lowered ala, and whose upper border to the position of the old scar, and the bottom of which is occupied by the fibromucosa which lies above the ala.

The cutaneous covering flap is cut vertically or more or less obliquely below and backward, in the region of the nasobuccal furrow. Of appropriate size and shape, its disposition should be such that its pedicle does not go beyond a horizontal line passing through the upper edge of its bed, while its anterior edge crosses the posterior part.

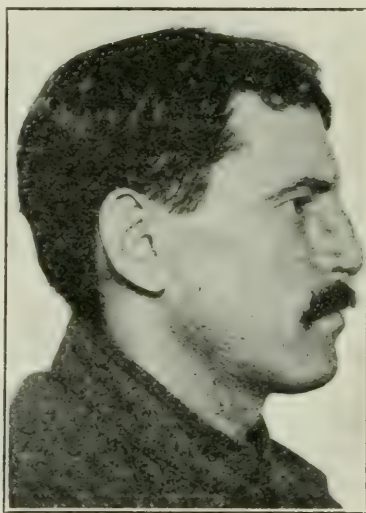


Fig. 38. Soldier P.

After swinging the flap upward at an angle of 90 degrees, its anterior edge, now superior, and its posterior edge, now inferior, are sutured to the corresponding borders of the lost tissue. Thanks to the disposition of this flap, the pedicle disappears entirely in the torsion, so that no secondary section is necessary (Figures 31, 32, 33).

Figures 34 and 35 show how satisfactory is the correction of this deformity. If the sutures are properly placed, but a short time will intervene between the operation and the recovery of the patient.

These are the types of procedures employed for the repair of the principal lesions of the tip structures of the nose observed by us. Their use, particularly in connection with total lesions of the septal portion, is attended with some difficulty and requires sufficient knowledge of rhinologic technic from the standpoint of the biologic value of the septum as much as the execution of the operation itself. Considering that surgical esthetics are less difficult of appreciation than general esthetics, we believe that we can say that our results in the main have been satisfactory and that they justify the publication of our article.

LXXIII.

RHINOPLASTY AND NASAL PROSTHESIS.*

BY PONT,

CHIEF OF THE STOMATOLOGIC CENTER OF THE XIV REGION.

When there is a loss of a part of the nose, whatever may be the cause, two methods of treatment are to be considered: rhinoplasty and prosthesis. Before sketching rapidly the evidences of the indications for one or the other, it is well to admit that theoretically the rebuilding of a nose by rhinoplasty, provided that the result is neither deplorable nor ridiculous, is always to be preferred to prosthesis. The latter, then, should be employed in only three conditions: 1. When rhinoplasty is impossible or contraindicated. 2. When rhinoplasty will not give satisfactory esthetic results. 3. As a temporary measure, either before or during the different stages of surgical treatment.

We have no intention of giving here the historical account of rhinoplasty and the description of the different methods which have been employed in turn. All of this has been described in another connection in the treatise on rhinoplasty by Nelaton and Ombredanne. At the present time rhinoplasty by means of a cartilage graft is the method chosen. This has found wide use since the war. It is because we have had occasion in the center of maxillofacial surgery at Lyon to observe numerous cases of nasal traumatism and loss of substance that I have thought it useful to give here a few observations on rhinoplasty and nasal prosthesis as well to complete the presentation which I have already made on this subject from the standpoint of the service which can be rendered us by prosthesis or rhinoplasty when their indications are judiciously examined and applied.

When there is a case of tubercular, syphilitic or cancerous lesions the general or local condition very often stands in the

*Translation made in the office of the Surgeon-General of the Army from the original which was published in *La Restauration Maxillo-faciale*.

way of any treatment which causes bleeding. Likewise prosthesis only can be employed in the case of extended burns of the face where the bad condition of the tissues of the frontal and cheek regions does not justify a hope of sufficient nutrition or vitality of the flaps. It is in this connection that I have had occasion to use prosthesis in the cases of lupus, tertiary syphilis, cancerous lesions or extended burns.

I have published a certain number of these observations during the last five years. In all of the cases the patients were seen and examined by competent surgeons, who had decided that rhinoplasty was contraindicated.



Fig. 1. Rhinoplasty made before the war. Result defective. Fig. 2. Esthetic correction by plastic prosthesis.

As a result of what we have just said, the principal indication for the use of rhinoplasty is summed up in the cases of loss of substance by traumatism, and that is why rhinoplasty with a graft of cartilage has been indicated many times during these last three years. However, we have had occasion to observe large traumatisms of the face, accompanied by a loss of substance so extensive that rhinoplasty was not indicated.

except as a final measure or at least after a long time. Nasal prosthesis found application in such cases.

In spite of the skill of the operator and the improvements of surgical methods, failure may result, and we must fully understand that rhinoplasty does not always give results which are perfect from the esthetic point of view. In this connection one is reminded of the expression of Verneuil when a case of rhinoplasty was presented before the Academy of Medicine: "The patient was frightful before, and now he is ridiculous." This expression, I am sure, will find an application less and less; however, it is not less true that prosthesis will sometimes be substituted.



Fig. 3. Cast of S., showing loss of nasal substance.

Case 1.—I cite in this connection the case of Lieut. C—— (Paul), forty-two years old. An old rhinoplasty had been done in 1911, after the Indian method, followed by the spontaneous expulsion of the metal frame through suppuration of the neighboring tissues.

This officer was wounded at Malancourt, February 25, 1915, by a fragment of a shell in the chin region, and was evacuated

to the Stomatologic Center at Lyon. The maxillo dental lesions were treated first and after they were healed attention was given to the nasal deformity.

As rhinoplasty had not given esthetically satisfactory results, we decided that it was useless to try a new treatment by autoplasty, and we constructed for this patient a nasal prosthesis in plaster which improves his facial appearance very greatly. (Figures 1 and 2).

Finally prosthesis will be of great assistance to avoid the crowding of our hospitals by allowing patients to be discharged as convalescents while waiting for rhinoplasty without suffering as objects of repulsion to their friends.



Fig. 4. Result after autoplasty.

In brief, rhinoplasty in the case of a loss of nasal substance by traumatism is especially seen to be proper and ought to be used save in exceptional cases. It is useful at the present time to lay stress on this point and to put its indications clearly in evidence.

Before presenting the patients upon whom I have made rhinoplasty with cartilage grafts, I have the honor of showing

you, in the name of Professor Collet as well as in my own name, the patient S——, a study of whom proves that in partial losses of nasal substance it is not always necessary to use a cartilage graft. By the old method of doubling over the skin satisfactory results can be obtained, as in the case of this patient.

Case 2 (Figures 3 and 4).—S—— (Pierre), twenty-five years old, 35th Regt. Inf., bullet wound Sept. 25, 1915, at Souain. The projectile penetrated a little behind the lobe of

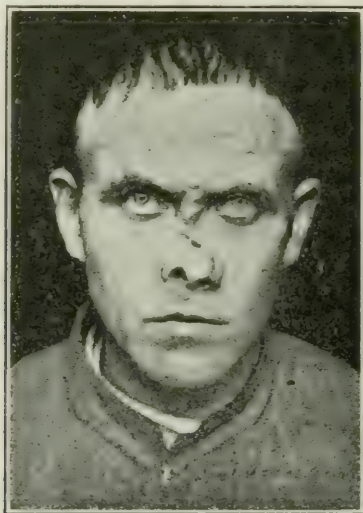


Fig. 5. The loss of substance before rhinoplasty.

the left ear in a spot scarcely perceptible at the present time and emerged on a level with the nasal bones.

From the maxillodental point of view there was found a fracture of the neck of the left condyle with lateral deviation of the inferior dental arch towards the left side.

A comminuted fracture of the nasal bones with loss of part of the dorsal surface of the nose over an extent of about 2 cm.

A crushing wound of the right thigh in the lower third had made amputation of that member necessary. A rhinoplasty was proposed with cartilage graft from one of the costal

cartilages. The patient on account of his amputation refused to allow the graft to be taken and he was sent to the orthopedic center of the 14th military district. He was finally admitted into the service of Professor Collet, who was willing to intrust him to me.

On January 25, 1916, under a general anesthetic, a deep flap was made at expense of tissues adjacent to the opening and a superficial flap was cut from the forehead intended after

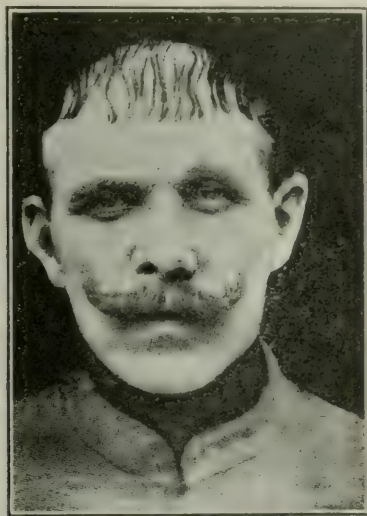


Fig. 6. After rhinoplasty.

turning to form the outer surface. The results were normal without general or local reaction.

On Nov. 3, 1916, a dental prosthesis was applied; Nov. 8, under local anesthesia, a second operation was done to correct the pedicle. The frontal wound healed normally and the scar is scarcely visible.

I now present two cases of rhinoplasty with cartilage graft, the first made in the case of a patient who had lost the entire middle portion of the nose.

Case 3 (Figures 5 and 6).—Th—— (Pierre), thirty-two years old, wounded by shell fragment April 22, 1916, at Avon-

court, showed a loss of substance and a depression of the dorsal surface of the nose with a comminuted fracture of the nasal bones; the tip was drawn up and held by an adhesion.

Aug. 9th, 1916, under general anesthetic cartilage graft for subsequent rhinoplasty.

October 11th, 1916, rhinoplasty under general anesthesia. 1. Incision permitting the tip of the nose to be lowered back into its normal position; two small lateral flaps turned back to constitute the deep layer. 2. A frontal flap containing the



Fig. 7. R., on his arrival at the Maxillofacial Center at Lyon.

graft was pressed down on the dorsal surface and sutured to the tip. The results were normal.

The second case, as the figure shows, exhibited a loss of the substance from the upper lip and an almost total loss of the nose except the left outside ala wall.

Case 4 (Figures 7 and 8).—R—— (Jean Baptiste), twenty-five years old, 114th Regiment of Infantry, was wounded in the face by a shell fragment May 18, 1916, at the Hill 304.

Condition on Admission.—Traumatic section of the upper

lip assuming the form of a median harelip, accompanied by the destruction of the lower portion of the septum and a cicatricial atresia of the nares; fracture of the superior maxillary with traumatic abrasion of eight teeth; fracture of the septum and probably of the vomer with loss of the dorsal portion of the nose; wound of the left frontal region and the left middle portion of the masseteric region.

Treatment.—On his arrival at the Stomatologic Center May 21, 1916, the nasal chambers and buccal cavity were



Fig. 8. Result following cheiloplasty and rhinoplasty.

washed antiseptically, care being taken to distend the nostrils by means of drains kept immovable.

July 31, 1916, under general anesthesia an autoplasmic operation was made on the upper lip. Dressing, no reaction following the operation, I decide to make a rhinoplasty with cartilage graft in a second series of operations.

September 1, 1916, removal of a costal cartilage of the left eighth rib. This graft was inserted under the skin of the forehead to the right of the left frontal wound, after removing the skin. No reaction.

The second part of the operation not being possible for two months, the patient was discharged as a convalescent for two months.

November 24, 1916, on his return from his convalescent period, rhinoplasty was performed. 1. Transverse incision of the dorsal surface of the nose to allow the tip to be straightened.

Two strips of skin were cut from over the nasal bones to constitute the deeper layer, the lower surface being continuous with



Fig. 9. Ch. Belgian Corporal repatriated from Germany after rhinoplasty.

the nasal mucosa. The nose was kept open by means of two large drains. 2. A frontal flap containing the graft was made and after being turned around 180 degrees was drawn down on the dorsal surface of the nose and sewed in a good position; ordinary dressing.

No reaction, local or general. A third operation was still necessary to divide the pedicle, in order to give the nose an esthetic form.

In consequence of the size of the frontal flap it was not

possible to cover the loss of substance by bringing together the edges of the wound. This wound, however, closed by the first intention without leaving a marked scar.

February 26, 1917, under general anesthetic the pedicle was corrected and thickened skin bud excised.

Likewise a slight cheiloplasty was necessary to remove an external cicatricial band. It is well for the sake of completeness to show the different methods of nasal prosthesis. But I have already had occasion several times to discuss this ques-



Fig. 10. The same in profile.

tion, and I will not return to it. I have presented, in turn, nasal, auricular and oculo-facial prosthesis, made by the plastic method. I should say, however, that in spite of all its advantages this method presents a certain inconvenience. The patient, especially when there is a case of nasal prosthesis, is obliged to recruit his strength for three or four days after putting on the artificial nose; therefore, in spite of the facility and rapidity with which this can be done many of these men carelessly wear their prosthesis exceptionally and thus the purpose in view is not fully attained. I have, therefore, sought to improve this method. I perform on my patients not only

the operation necessary for the models in plaster, but also a model in wax similar to the one which I am going to demonstrate to you in the case of a Belgian soldier who was returned to his country from Germany.

By recourse to the plastic method, I give my patients an appliance which lasts a short time, but is very esthetic. The second appliance is a "working appliance" which he can put on in the morning as easily as if he were putting on a pair of spectacles and which necessitates no special cost for repair.



Fig. 11. Ch. with prosthetic appliance.

This appliance may last several years if the patient is careful.

Case 5 (Figures 9, 10, 11 and 12).—Ch——, Belgian subject, twenty-four years old, wounded October 20, 1914, by a bullet which caused a total loss of the nasal substance and of the left half of the upper lip. He was dressed by the enemy and taken into captivity, but was sent back to his own country on May 19, 1916, and removed immediately to the Stomatological Center at Lyon. In Cologne he submitted to rhinoplasty by means of triangular strip from the middle of his forehead together with a graft from the tibia.

The upper lip was divided and restored imperfectly more-over by autoplasty. August 23, 1916, an operation was performed by Dr. Pont in order to reform the left labial commissure and to re-establish buccal occlusion. As the rhinoplasty undertaken in Germany had not given satisfactory results from an esthetic point of view, the patient was not willing to submit to other surgical operations, so we had recourse to a prosthesis.

The appliance which I have the honor to present to you is



Fig. 12. Appliance in profile.

made of a composition of vegetable and animal wax. It is not yielding but somewhat pliant without being broken. It is held on by spectacles. Its lower part, continuous with the lower septum, covers over half of the lower lip. An artificial moustache has been applied to hide the place where the prosthesis and lip come together.

The results from an esthetic point of view give entire satisfaction to the patient.

In recapitulation, rhinoplasty with a graft of cartilage, which is the method of choice, will always be preferable to the most

perfect and most esthetic prosthesis. The latter, however, will be indicated by the conditions in three cases:

1. When rhinoplasty is impossible or contraindicated.
2. When rhinoplasty does not give an esthetically satisfactory result.
3. As a temporary measure either before or during the different stages of surgical treatment.

Prosthesis by a plaster cast for which I gave the formula five years ago may be considered the prosthesis for "days of rest"—it is necessary for the patient to change the appliance often, for which reason I have made in addition a more resistant prosthetic appliance which may be called the working prosthesis.

I believe, therefore, that by this new method I have done away with the inconveniences and objections which might have been raised against the plaster prosthesis. Henceforth we can make it possible for wounded men who have not been able to take advantage of the benefits of rhinoplasty to assume their former occupations and live their normal life.

LXXIV.

ABSOLUTE REPOSE OF THE JAWS AS A TREAT-
MENT FOR TRAUMATIC PAROTID
SALIVARY FISTULÆ.*

BY PETER PIETRI,

HEAD OF THE SECTIONS FOR OTORHINOLARYNGOLOGY AND
AUTOPLASTY IN THE FRENCH HOSPITAL AT KIEW.

In the *Revue de Laryngologie* for March 5, 1916, we published an initial work on the important question of the parotid salivary fistulæ, and we proposed immobilization or absolute repose of the jaws as the preferable treatment, the result of the experience acquired under the direction of Professor Moure, head of the Otorhinolaryngologic Section of the 18th Region. A new year has brought us new cases which, since all have been treated systematically in the same manner with success, urge us to return to our initial study for the review of maxillofacial prosthesis.

We agree with Morestin in considering a salivary fistula present when a permanent abnormal orifice connects the passages for the saliva with the outside.

Relatively rare in times of peace, salivary fistulæ are, on the other hand, quite frequent in times of war; history shows us that they have been from antiquity up to the present time a subject of constant study for the practitioner who is called upon to remedy them.

Galen, ignorant of the existence of the parotid gland, had already observed that in wounds of the cheek a clear liquid was discharged which might well be saliva, and that is all.

Fabricius, of Aquapendente, in an analogous case, tells us quite simply: "Whence it comes and whither it goes, surely I don't know."

*Translation made in the office of the Surgeon-General of the Army from the original which was published in *La Restauration Maxillo-faciale*.

Ambrose Paré wrote: "There was a soldier who had received a sword thrust across the superior mandible, and when the wound healed there remained only a very little hole near the conjunction of the inferior and superior mandible, not larger at most than the head of a pin, from which when talking or masticating, there came out a large quantity of very clear water, and I have oftentimes seen it."

When Stenon had discovered and described the excretory duct of the parotid gland a new era was soon established for treating parotid fistulæ and chiefly those in which the duct only was injured.

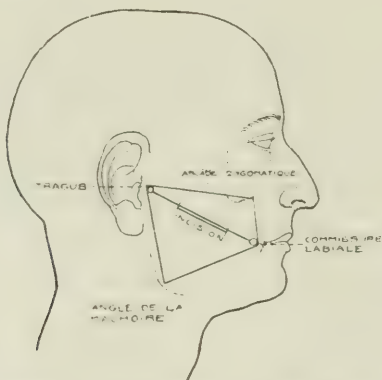


Fig. 1. Schematic plan for repair of Stenon's Canal.

The proceedings of the Académie Royale de Chirurgie, in 1757, have much to say about this question. Then followed in rapid succession the inauguration of new methods of operation, both in France and in foreign countries, by Deroy in 1760, Déjerine in 1811, Larrey-Désault, Vercy, Atti, Béchard, Gosselin, Trélat, Malgaigne, Lefort, Pozzi, Mollière, Richelot, etc. Finally, in these more recent years, the works of Fris, Coursier of Paris, Tussau of Lyons, Delarue of Paris, Joncour and Baillif of Bordeaux and many others, doubtless, whom I pass over without naming, by their number and diversity showing how difficult the question is to solve.

It is advisable to recognize two types:

- (a) The fistulæ of Stenon's duct;
- (b) The fistulæ of the parotid gland proper.

The first affect only the extraglandular portion; the second, on the contrary, affect the intraglandular part, which explains the great variation in the seat of the trouble which forms the subject of our study.

The extraglandular region of the parotid duct, or Stenon's duct, is the portion that extends from the anterior border of the parotid gland to the buccal orifice. Where it issues from the gland, Stenon's duct proceeds over the outer surface of the masseter, following a course somewhat obliquely upwards and forwards, drawing nearer to the zygomatic arch, from which

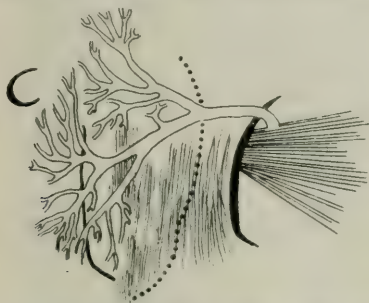


Fig. 2. Stenon's Canal and its principal branches after dissection.

it always keeps about a centimeter and a half away; at the level of the malar bone this distance may be reduced to five or six millimeters. When it arrives at the anterior border of the masseter it encircles it and the fat-ball of Bichat, where it hollows out into a deep fossa. It finally returns on the external surface of the buccinator and, resuming in the interior of this muscle its original anteroposterior direction, it opens upon the surface of the buccal mucous membrane through a narrow orifice, the exact location of which it is difficult to determine, for it varies according to the individual; nevertheless its most usual place is in the space between the first and second large molar. Application of a solution of cocain with ten per cent adrenalin to the mucosa renders the catheterization of it easier.

According to Baillif,¹ the region on the cheek that corresponds to the course of Stenon's duct is almost quadrilateral in form. "Its upper limit is marked by a line running slightly obliquely downward and forward, which follows the inferior border of the zygomatic arch and the malar bone. The inferior limit is marked by a line running from the labial commissure to the angle of the maxillary bone. The posterior limit is constituted by a line running somewhat obliquely downwards and forwards, which follows the posterior border of the ramus of the inferior maxillary. Finally the anterior limit is formed



Fig. 3. Wound of the face involving the parotid region and that of Stenon's duct.

by a line parallel to the posterior border of the quadrangle. The tragus lies at the posterior superior angle, and the labial commissure at the anterior inferior angle. The tragus and the labial commissure are two landmarks; a straight line between these two points shows the direction of Stenon's duct."

This quadrangle embraces two regions which are called the masseteric and buccinatory. We need not pay special atten-

1. Baillif: Thèse de Bordeaux, 1898-98.

tion to these if we are not operating on fistulæ of Stenon's duct; but we ought to mention them, for these two regions play a leading part in mastication and speaking; and our treatment depends on the absence of these two actions.

The direction of Stenon's duct is not always as precise as that just indicated. Baillif states that, in the investigations he made on the cadaver, under the direction of Professor Princeteau, he happened to find one instance in which the



Fig. 4. Site of the fistula in the posterosuperior portion not involving the excretory canals of the parotid.

direction followed a line running from the tragus to the ala of the nose.

Joncour¹ studied with care the intraglandular part of the parotid duct; like all anatomists who have studied the site of the parotid gland, he states that this gland is very irregular, and for this reason hardly to be designated by any well known geometric form. In the same person it may even present an absolutely different form on the right side and on the left.

1. Joncour: Thèse de Bordeaux, 1898-99.

As the original branches of Sténon's duct proceed from different parts of this gland we may form an idea of the varied character of their number and arrangement.

In order to study the intraglandular part of the parotid duct in detail, Joncour injected colored gelatin after taking care to dissect Sténon's duct somewhat at its buccal orifice, so as to fix firmly the point of his syringe by means of a ligature.

The excretory duct, he says, "as far as the course in the interior of the gland is concerned," shows numerous divergences.



Fig. 5. Mutilation of the face; the entire parotid excretory system involved.

Generally the intraparotid duct has an oblique course upwards and forwards, and its point of emergence is at the junction of the upper and middle third of the anterior border of the parotid gland. (Figure 2.)

Further the intraglandular median duct, which is quite superficial at the anterior part of the parotid gland, becomes deeper and deeper as it approaches its point of origin.

The diagnosis is self-evident. The history of the patient exhibits the nature of the trouble.

Actinomycosis, in particular actinomycosis at the entrance of Stenon's duct, and the lymphatic fistulæ of this region, to mention only these two affections, have characters clearly differentiated, and the regularity of the flow upon which mastication practically has no influence, or chemical analysis of the liquid secreted is sufficient to establish a definite diagnosis.

During the intervals between meals the condition is bearable, but when the least gustatory stimulation takes place, the



Fig. 6. Fistula in the middle third involving the entire parotid substance.

flow becomes truly a torture. The patient is really inundated and is required to put compresses over the opening of the fistula, which must be changed frequently on account of the abundance of the flow; he no longer dares to appear in public and condemns himself to an isolation which soon becomes harassing, so that he no longer dares to eat or to talk.

Certain authors, especially Morestin, have made investigations to find out how much of the liquid is secreted in the course of a meal.

Twenty to two hundred and eighty grams seem to be mod-

erate figures. Duplessis, for instance, was able to collect eighty-eight grams in eighteen minutes, and Duphoenix one hundred and twenty grams in twenty-eight minutes.

It seems clear, then, that salivary fistulæ, to which we are giving our attention, constitute a real infirmity by reason of interference with social life, not to mention the reaction upon the general condition in time; these justify all of the importance given to their treatment.

The prognosis of salivary fistulæ will vary according to the



Fig. 7. Transverse wound of the face with fistula of Stenon's duct.

site and direction of the wound caused by the producing instrument. The anatomic facts stated above show that a wound situated farther from the median main tract will affect quite a large number of collateral branches (Figure 3), while a wound in the upper or lower part of the gland will, especially if superficial, affect only canalicular branches of slight importance. These last are the fortunate cases; the external flow of saliva will be rather slight and spontaneous cicatrization comparatively easy. (Figures 4 and 5.)

If the wound is parallel to the principal parotid duct and

is situated a very short distance from it, the collateral branches proceeding from that portion of the gland will be affected above and below the lesion at the point where they unite into the main duct, and the saliva carried by these branches will flow externally instead of going down into the excretory duct.

As the flow of the saliva is produced abundantly during mastication, cicatrization will become very difficult if not impossible.

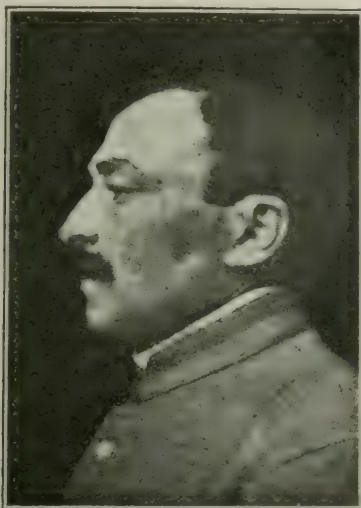


Fig. 8. Transverse wound of the face with punctiform fistula of Stenon's duct. Only by absolute fixation of the maxillary was it possible to stop the salivary secretion.

Let us assume that there is a vertical wound of the parotid gland; in this case the median duct will either be involved or not.

If the median duct is spared, the collateral branches involved will often be of little importance, and in all cases they will be rather few and the salivary flow from the gaping wound will be comparatively small and the cicatrization easy. (Figure 6.)

If, on the contrary, the traumatism includes the central duct

of the gland and destroys its continuity, the flow of saliva from the wound may be very abundant. (Figures 7 and 8.) All of the saliva poured down from the collateral branches above the intersection will continue to proceed towards the mouth to the level of the open wound through which it will flow. Further, as the presence of valves regulating the flow of the saliva in the excretory duct has not been demonstrated, a portion of this saliva collected by the collateral branches into the drain canal below the place of the traumatism will possibly flow

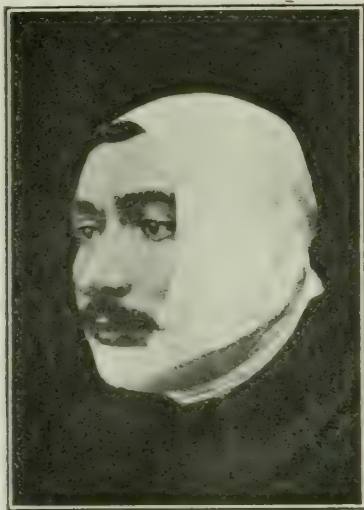


Fig. 9. Our dressing. The patient has a salivary fistula of the left parotid.

through the wound instead of being directed towards the mouth. Surgical intervention in this case, for example, in order to be successful, should endeavor to force the saliva poured into the canal behind the break in continuity to flow towards the mouth, and should also prevent at the same time the saliva poured into the anterior portion of the canal from flowing through this wound.

If the second part of the problem seems to be easy to realize, the first on the contrary appears impossible. The posterior

part of the gland becomes impaired and will continue to secrete and its secretion will prevent cicatrization, the result sought by the physician and so much desired by the patient.

Treatment.—The multiplicity of procedures proposed proves that none of them can be used in preference to the others for an assurance of cure.

In order to reduce the possibility of numerous subsequent procedures, it is well, in the succession of operations, to go from the simple to the complex. It is for this reason that the



Patient shown in Fig. 10 after the performance of Monre's genioplasty.

treatment applied by Professor Moure should be employed; it puts into practice the famous principle, alas! too often forgotten: *Primum non nocere*.

I have not found the procedure of the absolute repose of the jaws suggested in any of the papers which I have consulted on this subject.

The compression of the gland is advised by Maisonneuve,

whose method, although of little efficacy, is set forth at length by Rousseau.¹

Caustics and agglutinants—like the gold plate used by Malgaigne and Rodolphi's collodium—have had their day. For the sake of record, I mention also the compression of the carotid and the ablation of the parotid gland, without any comment.

Borel tells us of the ligation of Stenon's duct which was made by Viborg and which seems to have been accepted by Velpeau.



Fig. 10. Same patient as in Fig. 9 showing binding appliance.

The obliteration of Stenon's duct by a foreign body was the method proposed by Julliard who, in the *Annales médicales de la Suisse romande*, for 1883, reported good results by the introduction of salts of laminary into the canal.

Injections to produce atrophy were recommended in 1884 by Mollière of Lyon. He used phenolated oil, and a little later Settímio Cocchini gave preference to turpentine, either pure or mixed with olive oil.

1. Rousseau: Thèse de Paris, 1909.

The surgical procedures which depend on the source of the saliva remain to be discussed. The source is often illusive, for the permeability of Stenon's duct does not always follow with a pleasing result after intervention, so that one may often be right in thinking that Stenon's duct, buried in cicatricial tissue, has quite simply disappeared, as if it had been ligated.

I say nothing of these surgical procedures, thinking that before trying to change the course of the saliva, it is more logical to try to lessen its production.

It will be best to first diminish the production of this saliva as far as possible by the absolute repose of the jaws, through the agency of our mask (Figure 9), at the same time suppress-

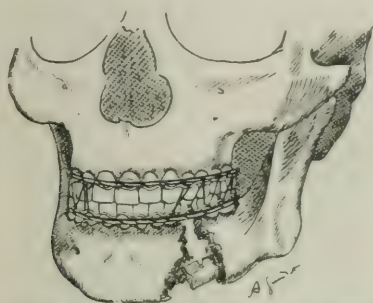


Fig. 11. Model of fixation appliance.

ing all gustatory sensation and putting the patient entirely upon a liquid diet for several weeks by means of a long tube, and imposing upon him absolute silence as far as possible.

Feeding is resumed afterwards gradually, beginning with porridges, pastries, milk foods, and eventually bread and food that require mastication.

The headpiece that we use is very simple. It is a sewed bandage which prevents opening the mouth. It is well to pad the regions connected with the ear, and sometimes also to arrange a pad of gauze on a level of the fistula. This mask shall be renewed whenever it is deemed advisable and immediately replaced by one exactly like it.

In certain cases accompanied by fractures of the maxillary it will be possible to combine with advantage the headpiece and the fixation of the jaws according to the method used with

success at the Stomatologic Center of the Eighteenth Region. (Figures 10 and 11.)

By limiting in this extreme and almost absolute manner the physiologic functions of the parotid gland and exercising a little patience, the fistula will dry up, then close or in case of failure there will still be time enough to employ the surgical procedure of choice to turn the course of the saliva which by its presence prevents the cicatrization of the fistula. (Figures 12 and 13.)

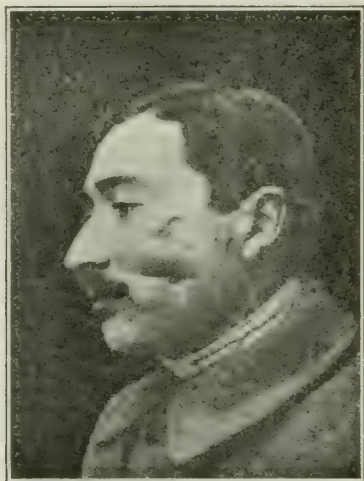


Fig. 12. Patient shown in Fig. 9 on arrival at the hospital. The saliva flows copiously from a crater like granulating wound at the slightest movement of mastication.

We do not know what happens to the parotid gland in the course of our treatment, but we think that it becomes adapted quite simply to the condition of repose, and when mastication is resumed, if the excretory duct is permeable, the normal function returns as the parotid gland on the opposite side. In the cases where there has been no infection, can we assume an atrophy of the gland? I do not think so.

The atrophy of a gland after the ligature of its excretory

duct comes about only very slowly, physiologists tell us, and there should be the same conditions in cases where a parotid fistula is little or not at all infected, while, on the contrary, in cases of parotiditis consequent upon traumatism, the destruction is rapid and permanent.

In most of the cases which we have had to treat, we think the glandular tissue proper becomes sclerotic and adheres firmly to the tissue framework which before had acted as a support pure and simple, but this is an hypothesis which histologists may verify.

Conclusion.—Can we say that this way of treating parotid salivary fistulæ by an absolute repose of the jaws is infallible? This is far from our opinion, in spite of the uniform success up to the present time, but it is so harmless, so easy to employ, and the results obtained are so encouraging that we believe it is worthy of trial and, at least, of interesting even the most skeptical.

The figures which illustrate this article are taken from among the most characteristic of the thirty-eight cases observed and cured.

LOCAL ANESTHESIA: ITS TECHNIC IN SURGICAL INTERVENTIONS ON THE FRONTAL AND MAXILLARY SINUSES.*

BY GEORGES CANCYT, BORDEAUX, AND J. ROZIER, PAU.

General anesthesia always presents dangers, both immediate and consequent to the intervention or to the patient, whatever anesthetic may be used.

Whenever there is narcosis, there is danger. The immediate dangers are asphyxia, syncope and, above all, death. The mortality due to general anesthesia is slight, but it exists beyond question much more frequently than is reported.

The secondary results are manifested in the liver, the kidneys, the lungs and the general condition, and may go as far as death. The surgeon then brings in the diagnosis of shock under operation, but rarely assigns the real cause: the general anesthetic.

Regional and local anesthesia are the two kinds used constantly in otorhinolaryngology.

The purpose of regional anesthesia is to reach the nerve trunks whose branches give the sensation to the site of operation. It is applied at some distance from the field of operation. In bringing the anesthetic agent into contact with these nerve trunks, their connection is suspended and there is temporarily a real disconnection, from a physiologic point of view, which renders the field of intervention insensible.¹

Local anesthesia is too well known for us to insist upon a description. The name of Reclus² will continue to be connected with it permanently, for he was truly its father. Local

*Translation made in the office of the Surgeon-General of the Army from the original which was published in *La Restauration Maxillo-faciale*.

1. Pauchet & Sourdat.

2. See Piquand, *L'anesthésie locale par infiltration (méthode de Reclus)*.

anesthesia by infiltration, the method of Reclus, has rendered a tremendous service not only in our special field but also to general surgery.

In this article we set forth in detail the technic of anesthesia for operations upon the frontal and maxillary sinuses. It will be evident that we consider regional and local anesthesia together, for if regional appears sufficient theoretically it is still practically preferable to use local anesthesia in addition for constancy of result.

We take the liberty of making two suggestions:

1. There is a need of practice; successful anesthetics can be obtained only after many of them have been performed. It is a curious thing to find that many surgeons who understand very well that a long apprenticeship is necessary in order to administer chloroform properly are anxious to see their first attempt with a local anesthetic successful.

2. There is a need of patience; in fact, when the local anesthetic has been administered it is always necessary to wait at least a quarter of an hour before operating.

In order to manage to reach with precision the nerve filaments which it is desired to anesthetize, it is necessary to have a thorough knowledge of the anatomy of the region. So before beginning the technical study of local anesthesia for the frontal or maxillary sinuses we have thought it useful to run over summarily the tract and the point of emergence of the nerves which control the sensations of the face.

These nerves all belong to the trigeminus, or the fifth pair of cranial nerves.¹

ANATOMY.

Trigeminal Nerve.—The three large terminal branches of the trigeminus leave the ganglion of Gasser (Figure 2), lying over the inner part of the anterior surface of the petrous. They are, from within outward:

- I. The ophthalmic nerve, which enters into the orbit through the sphenoid fissure;

- II. The superior maxillary nerve, which leaves the cranium through the large foramen rotundum;

1. Testut, *Traite d'anatomie humaine (système nerveux)*.

III. The inferior maxillary, which goes through the foramen ovale.

The first two nerves are the only ones which we are studying, for they are the ones to be anesthetized for operations upon the frontal or maxillary sinuses.

I. Ophthalmic Nerve (Figure 2).—At the point where it enters the orbit the ophthalmic nerve is divided into three terminal branches: the nasal, frontal and lacrimal.

A. The Nasal Nerve.—The nasal nerve follows the inner wall of the orbit, proceeding towards the inner anterior orbital foramen, at the level of which it is divided into two branches, the external nasal and the internal nasal or anterior ethmoidal.

1. The external nasal nerve extends along the inferior border of the superior oblique muscle, and five or six millimeters posterior to the border of the orbit it divides into three branches:

(a) Superior branch running towards the inner part of the upper eyelid and the space between the eyebrows:

(b) Inferior branch, which supplies the lacrimal sac, lacrimal ducts and inner part of the lower eyelid:

(c) Median branch which, proceeding horizontally forward, leaves the orbit and branches out in the skin of the upper part of the dorsum of the nose, then its root extends to the lower border of the nasal bones proper.

2. The internal nasal nerve passes through the inner anterior orbital foramen, over the cribriform plate of the ethmoid, through the ethmoid foramen and enters the nasal fossa, dividing into two branches:

(a) The internal supplies the mucous membrane of the septum (anterior half):

(b) The external, which is to supply the anterior portion of the mucous membrane of the turbinates and the meatus, passes to the outer wall of the nasal fossæ and then under the skin of the alæ of the nose.

B. Frontal Nerve.—The frontal nerve enters into the orbit through the external portion of the sphenoid fissure and runs along the superior wall. Behind the posterior border of the orbit it separates into the external and internal frontal nerves (Figure 1).

1. The external frontal nerve leaves the orbit through the supraorbital foramen or groove and divides into:

(a) Frontal (Figure 3) or ascending branches distributed to the skin of the frontal region:

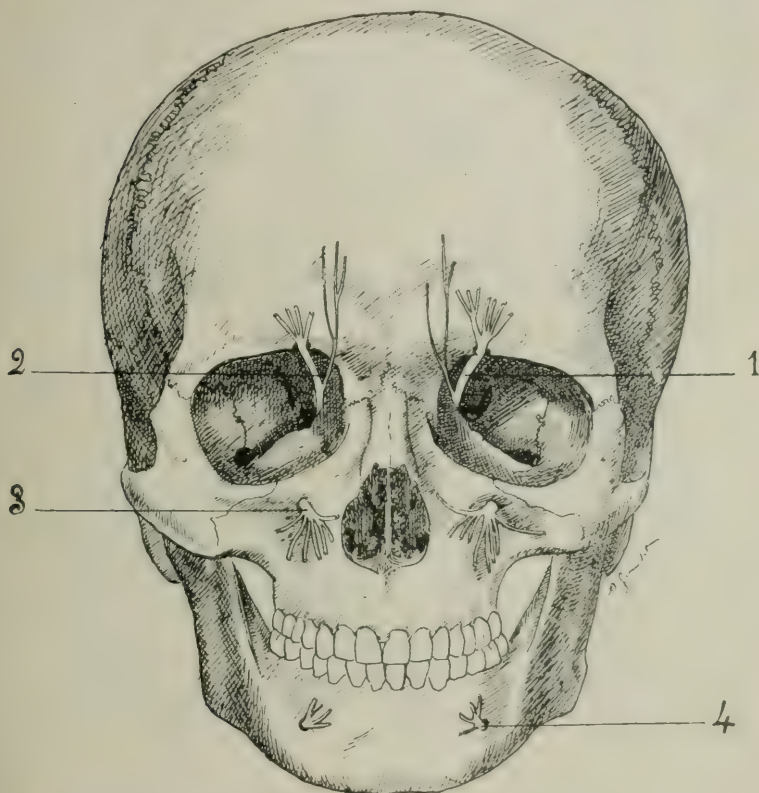


Fig. 1. Schematic.

Emergence of the terminal branches of the Trigeminal.

1. Supraorbital or external frontal nerve. 2. Internal frontal nerve. 3. Infraorbital nerve. 4. Mental nerve.

(b) Palpebral (Figure 3) or descending branches to the skin and mucous membrane of the upper eyelid;

(c) An osseous branch which leads directly into the thickness of the frontal bone and is distributed in part to the diploe

and the pericranium and in part to the mucous membrane of the frontal sinuses.

2. The internal frontal nerve (Figure 1) leaves the orbit between the external border of the frontal and the superior oblique. At the level of the orbital border it gives off frontal filaments (Figure 3) (periosteum and skin of the forehead), palpebral filaments (Figure 3) (skin and mucous membrane of the inner part of the upper eyelid), and nasal filaments (Figure 3) (skin of the region between the eyebrow).

C. Lacrimal Nerve.—This nerve follows the external wall of the orbit and supplies sensation to the skin and the mucosa of the outer part of the upper eyelid.

Summary.—The ophthalmic nerve supplies sensation to the anterior two-thirds of the occipitofrontal region, the superciliary region, the internal two-thirds of the upper eyelid, the inner part of the lower eyelid, and finally the inner part of the ala of the nose.

II. Superior Maxillary Nerve (Figure 2).—This nerve leaves the cranium through the large foramen rotundum, penetrates the posterior portion of the pterygomaxillary fossa, which it crosses obliquely, and then enters into the infraorbital canal. It passes through the infraorbital foramen and spreads out into numerous terminal branches, the infraorbital nerves (Figures 1 and 3), which are distributed to the skin, and the mucous membrane of the cheek, nose and upper lip.

In the pterygomaxillary fossa (Figure 2) the nerve occupies the most elevated part of the region.

In the infraorbital groove the superior maxillary is separated from the soft parts of the orbit by a simple fibrous layer.

In the infraorbital canal (Figure 2) it follows the bony wall of this channel over its whole course.

From its entrance into the infraorbital groove to the infraorbital foramen the superior maxillary nerve follows the roof of the maxillary sinus (Figure 2), from which it is separated by only a thin bony plate. This last even may be lacking in places, in which case the nerve is separated from the sinus by only the mucous membrane.

From the ganglion of Gasser, where it starts, to the infraorbital foramen the superior maxillary nerve gives off five branches (Figure 2):

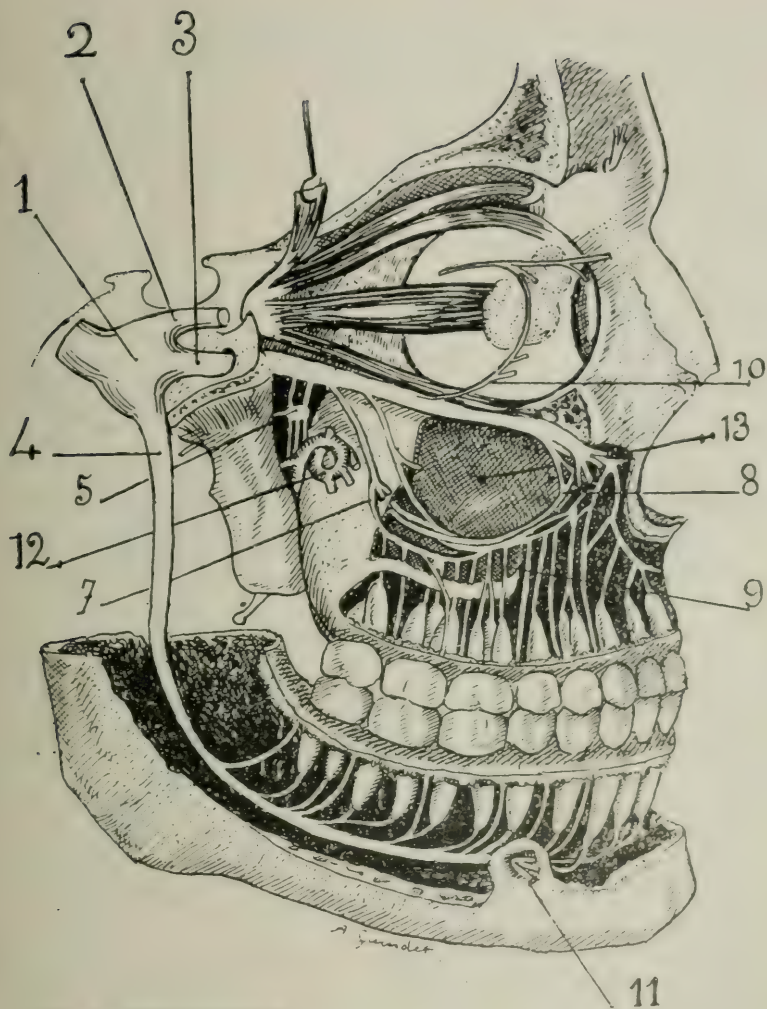


Fig. 2. Semischematic.

Superior maxillary nerve and inferior maxillary nerve; their distribution and branches.

1. Gasserian ganglion. 2. Ophthalmic nerve. 3. Superior maxillary nerve. 4. Inferior maxillary nerve. 5. Sphenopalatine ganglion and anterior middle and posterior palatine nerve. 7. Posterior dental nerves. 8. Anterior dental nerves. 9. Dental plexus. 10. Orbital branches. 11. Mental nerve. 12. Internal maxillary artery. 13. Maxillary sinus.

A. The middle meningeal branch which, having its origin in the cranium, is distributed to the dura mater.

B. The orbital branch (Figures 1 and 10), which penetrates into the orbit through the sphenomaxillary fissure, runs along its external wall and there divides into two branches: a superior or lacrimopalpebral branch (lacrimal gland and upper eyelid) and an inferior or temporomalar branch (skin of the temple).

C. The sphenopalatine nerves, two or three in number, are sent off within the pterygomaxillary fossa, and after a short course join the sphenopalatin ganglion.

D. The posterior and superior dental nerves, two or three in number, branch off from the superior maxillary just as it enters the infraorbital groove. They descend to the tuberosity of the maxilla, give off several twigs to the buccal mucous membrane and to the gums, and enter the bony canal in proximity to the molar teeth. There they form plexuses from which are distributed:

1. Dental filaments (roots of the large and small molars);
2. Alveolar filaments (periosteum of the sockets of the teeth);
- (3) Mucous filaments (mucous membrane of the maxillary sinus);
4. Osseous filaments, which are lost in the maxilla itself.

E. Anterior dental nerve (Figures 2 and 8) starts eight or ten millimeters posterior to the infraorbital foramen, and proceeds towards the incisors. It sends out recurrent filaments which anastomose with the dental plexus noted above and is finally lost in the following:

1. Nasal filaments (mucous membrane of the nasal canal);
2. Dental filaments (roots of the two incisors and the corresponding canine);
3. Alveolar filaments (alveolar periosteum and mucous membrane of the gums);
4. Osseous filaments (superior maxillary).

F. Infraorbital Branches (Figures 1 and 3).—The terminal branches of the superior maxillary nerve are divided into three groups:

1. Ascending or palpebral filaments (skin and mucous membrane of the lower eyelid);

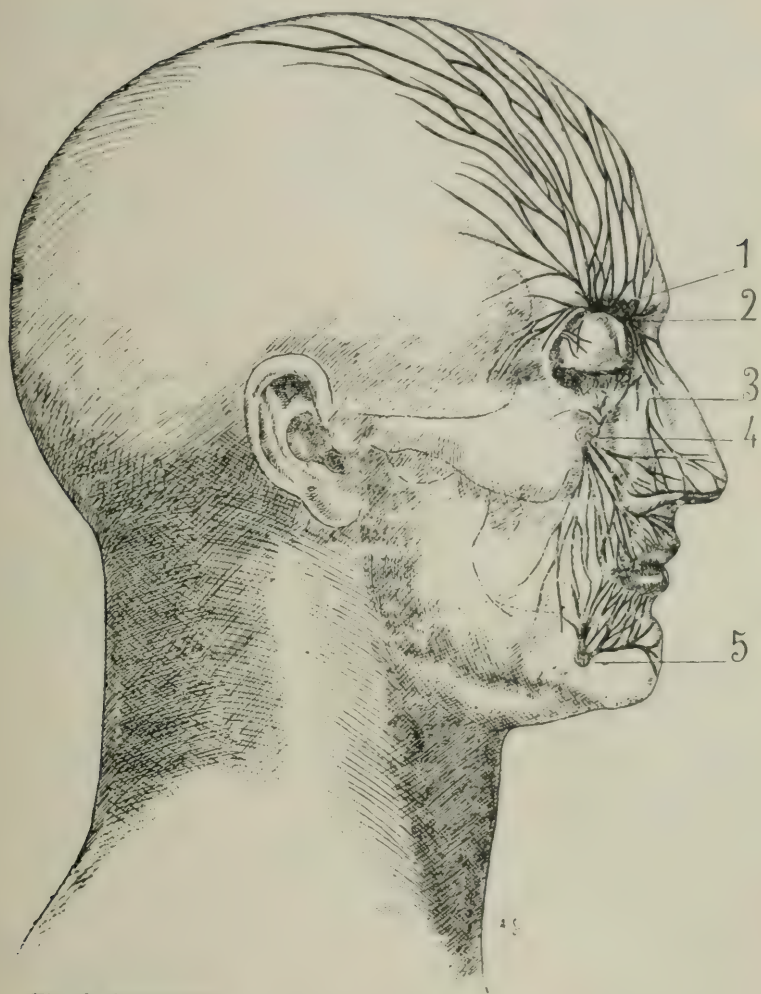


Fig. 3. Schematic.

Terminal and superficial branches of the ophthalmic superior maxillary and inferior maxillary nerves.

1. External frontal or supraorbital nerve, with its filaments spread out to the skin of the cranium and upper eyelid. 2. Internal frontal nerve with frontal palpebral and nasal branches. 3. External nasal nerve. 4. Infraorbital nerve. 5. Mental nerve.

2. Descending or labial filaments (upper lip, skin and hair bulbs and the underlying mucous membrane and glandular bed);

3. Internal or nasal filaments (skin of the ala of the nose and of the vestibule of the nasal fossæ).

G. Sphenopalatine ganglion (Figures 2 and 5, Figures 5 and 1), or ganglion of Meckel.—This ganglion is located in the pterygomaxillary fossa and joined to the superior maxillary nerve.

It sends out nerve fibers which carry sensation to the nasal fossæ, the palate and the upper part of the pharynx. These are:

1. The pharyngeal or pterygopalatine nerve, which gives sensation to the upper part of the pharynx and the eustachian tube;

2. The superior nasal nerves descend into the nasal fossæ through the sphenopalatine foramen and are divided into:

a. External branches to the superior meatus and the superior and middle turbinate, the roof and lateral wall of the pharynx;

b. Internal branches (mucous membrane of the septum);

c. Orbital branches (external wall of the orbit, posterior ethmoid cells and the sphenoid sinus).

3. The palatine nerves (Figures 5 and 6) are three in number and descend into the posterior palatine canal:

(a) The anterior palatine nerve (Figure 5) supplies the mucous membrane of the roof of the mouth, the soft palate, the middle and inferior meatuses, the inferior turbinate and the maxillary sinus;

(b) The middle palatine nerve (Figure 5) (mucous membrane of the tonsils and the pillars of the palate);

(c) The posterior palatine nerve (Figure 5) (the two surfaces of the soft palate).

TECHNIC OF LOCAL ANESTHESIA FOR THE FRONTAL SINUS.

General Remarks.—Local anesthesia is preferable to general anesthesia in the radical cure of frontal sinuitis. In fact, if the technic to be described is followed with precision, the anesthesia is perfect, and to us it seems quite useless to submit a patient to operation under chloroform with the incon-

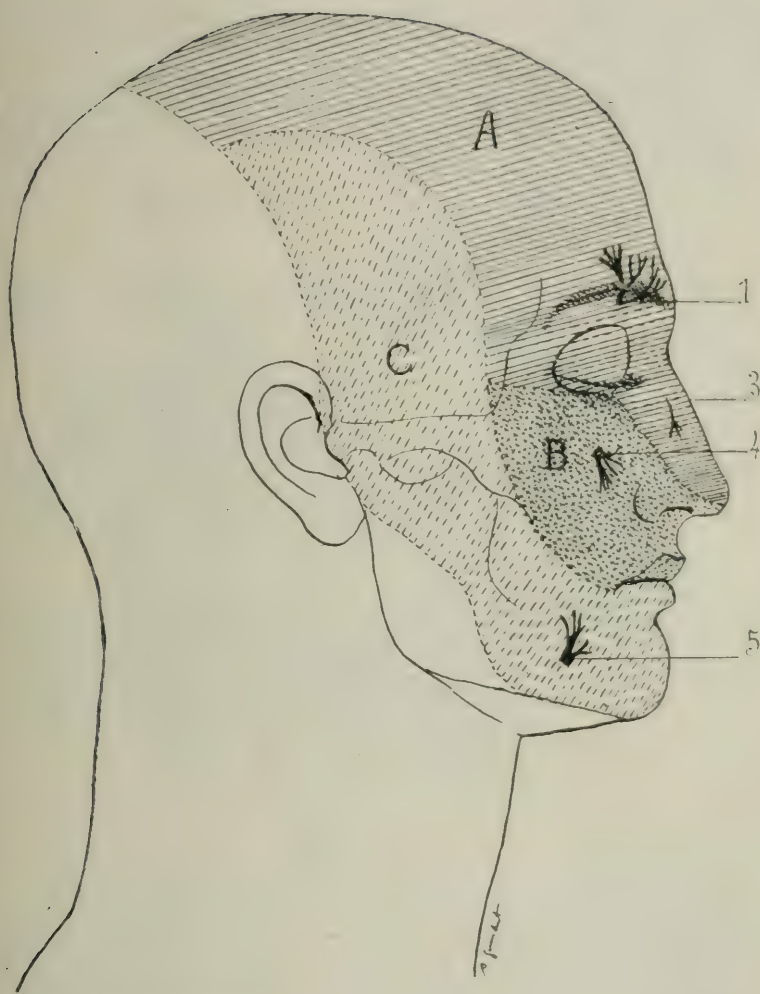


Fig. 4. Schematic.

Trigeminus nerve. Sensative zones dependent upon this nerve.

A. Sensative territory of the ophthalmic nerve. B. of the superior maxillary nerve. C. Of the inferior maxillary nerve.

1. Supraorbital or external frontal nerve. 3. External nasal nerve.
4. Infraorbital nerve. 5. Mental nerve.

veniences which accompany this method of anesthesia during and after operation.

However, it should be added that while we prefer local anesthesia for the radical cure of frontal sinusitis, we do not absolutely condemn general anesthesia, as we do in the radical

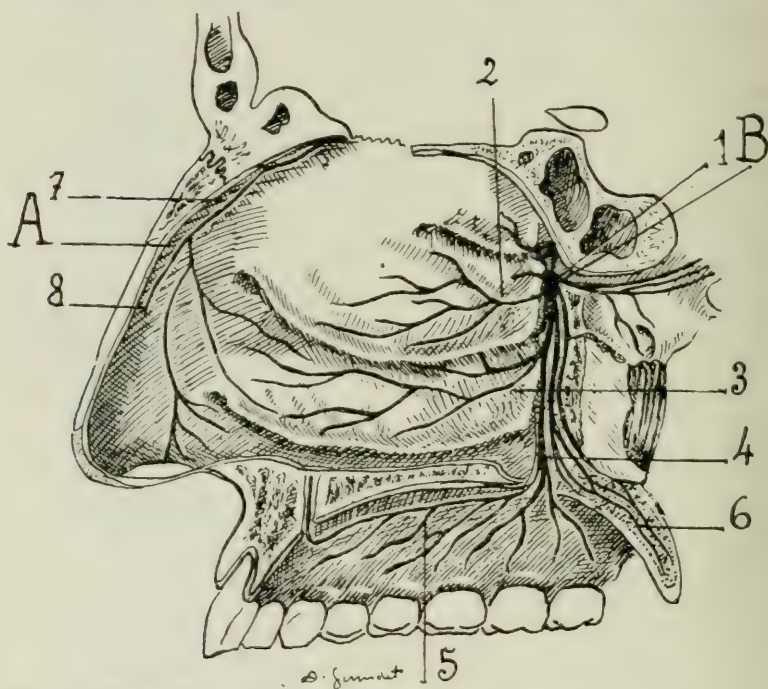


Fig. 5. Schematic.

Innervation of the external wall of the nasal fossae.

A. Territory of the ophthalmic nerve. B. Territory of the superior maxillary nerve.

1. Sphenopalatine ganglion. 2. External sphenopalatine nerve. 3. Posterior nasal nerve. 4. Anterior palatine nerve. 5. Anastomosis of the anterior palatine nerve with the external sphenopalatine. 6. Terminal branch of the middle palatine nerve. 7. External branch of the internal nasal. 8. Nasolobar nerve.

cure of maxillary sinusitis. This is an important point which we think should be noted.

On the other hand, the technic which we are about to describe is only applicable, of course, if the Ogston-Luc method

as modified by Moure is employed, namely, free opening of the frontal sinus near the root of the eyebrow (cutaneous incision along the eyebrow), careful and complete curettage of the sinus cavity, including all diverticula, if any exist, enlargement with the curette and clearing out of the infundibu-

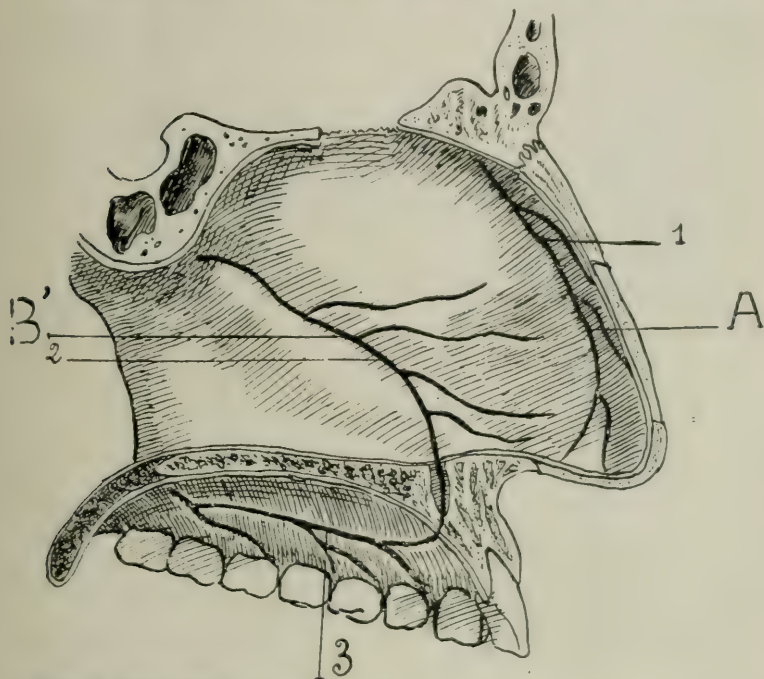


Fig. 6. Schematic.

Innervation of the internal wall of the nasal fossæ.

A¹. Territory of the ophthalmic nerve. B¹. Territory of the superior maxillary nerve.

1. Branches of the internal nasal. 2. Internal sphenopalatine nerve. 3. Anastomosis of the internal sphenopalatine with the anterior palatine nerve.

lum in the anterior ethmoid region, with free communication of the sinus and the corresponding nasal fossa, and immediate complete suture of the skin.

This operation, in Professor Moure's service, has always given good results.

As for the various mutilating and useless external methods, they have been replaced, and we will not speak of them again.

Instrumentation: A syringe (model left to choice of operator); a fine strong needle.

Anesthesia of one frontal sinus: Twenty cubic centimeters of novocain solution 1/200, to which is added six drops of adrenalin solution, 1/1,000. A solution of cocain hydrochlorate 1/10, for anesthesia of the nasal fossa and ethmoid.

Anesthesia of both frontal sinuses: Forty cubic centimeters of novocain solution 1/200, cocain solution 1/10, for anesthesia of the nasal fossæ and ethmoids.

Technic.—The ophthalmic nerve cannot be reached by local anesthesia. It is necessary to direct the needle as far as the sphenoidal fissure, which is a dangerous proceeding, because of the proximity of the motor nerves of the eye. We must be content therefore to irrigate its terminal branches.

The most important nerve to attack is the supraorbital or external frontal, which emerges from the orbit at the supra-orbital notch of the orbital arch at the junction of its inner and middle thirds.

To get perfect anesthesia the nerve should be attacked in the orbit, in contact even with the roof, before the branches emerge, and where it approaches the internal frontal nerve which supplies the internal portion of the upper lid.

The soft parts are first infiltrated, then the periosteum, and where the external frontal nerve emerges.

For this purpose, as indicated in the accompanying figures, it suffices to circumscribe the operative field with a series of punctures (Figures 7 and 8); it will be noted that not only is the region of the frontal sinus to be operated on anesthetized, but also at least the inner half of the opposite frontal sinus. In fact, it is frequently found that the sinus and nasal septum, instead of being in the median line, are situated two, three or four centimeters away from it, at the expense sometimes of the right and sometimes of the left sinus. Moreover, the two sinuses may communicate with each other, and in the course of operation it may be necessary to go beyond the strict theoretical limits of the operated sinus. For these reasons then the anesthesia must always be extensive, comprising much territory on the opposed side. We have often found this foresight valuable.

The nasal fossa and ethmoid are anesthetized by tampons.

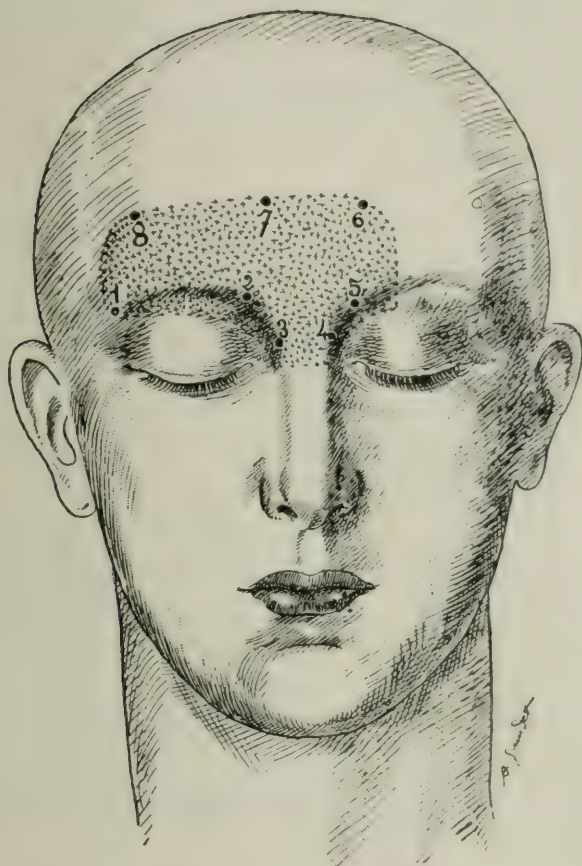


Fig. 7. Anesthesia of the frontal sinus.

The figures 1 to 8 indicate the exact points where the needle should be introduced in order to effect anesthesia of the frontal sinus.

The zone of anesthesia is shown in the figure; however, it should be understood that the anesthesia passes by the diffusion of the liquid beyond the zone indicated.

It is quite effective, especially if one leaves in place a wad of cotton saturated with cocain during the entire operation, thus maintaining the anesthesia up to the moment of establishing nasosinus communication.

Advantages.—These are all the known and classic advantages of local anesthesia, namely, hemostasis, considerable lessening of the gravity of operation, harmless postoperative results, etc.

Inconveniences.—These are negligible. The principal one is that the anesthesia must be successful and that it can only be attained after a long apprenticeship.

Indications.—Local anesthesia of the frontal sinus and corresponding nasal fossa is indicated for:

1. The radical cure of unilateral and bilateral frontal sinusitis. This is the most frequent condition and should be absolutely well in hand.

2. Radical cure of traumatic frontal sinusitis, particularly that seen in war.

We must say, however, that in traumatic sinusitis the anesthesia is not as good as in ordinary sinusitis; in fact, the contused, damaged and scarred tissues are less responsive to anesthesia. One should carefully increase the dose a little and use 25 or 30 cubic centimeters of novocain solution for each sinus to be operated upon.

3. Foreign bodies and war projectiles in the sinuses. This is the least important indication, but gives excellent results on condition that the projectile has been carefully localized before operation. We urge that operating for projectile be done under intermittent fluoroscopy, if an unsuccessful operation is to be avoided.

TECHNIC OF LOCAL ANESTHESIA OF THE MAXILLARY SINUS.

General Remarks.—For the radical cure of maxillary sinusitis local anesthesia is the method which should be employed.

The technic about to be described is applicable to the radical cure of maxillary sinusitis according to the Caldwell-Luc operation:

1. Free opening of the canine fossa.
2. Complete curettage of the antrum.
3. Free communication between the sinus and nasal fossa.

It is the only method employed at Bordeaux by Professor Moure and has always given perfect satisfaction.

We absolutely condemn general anesthesia (Moure), be-

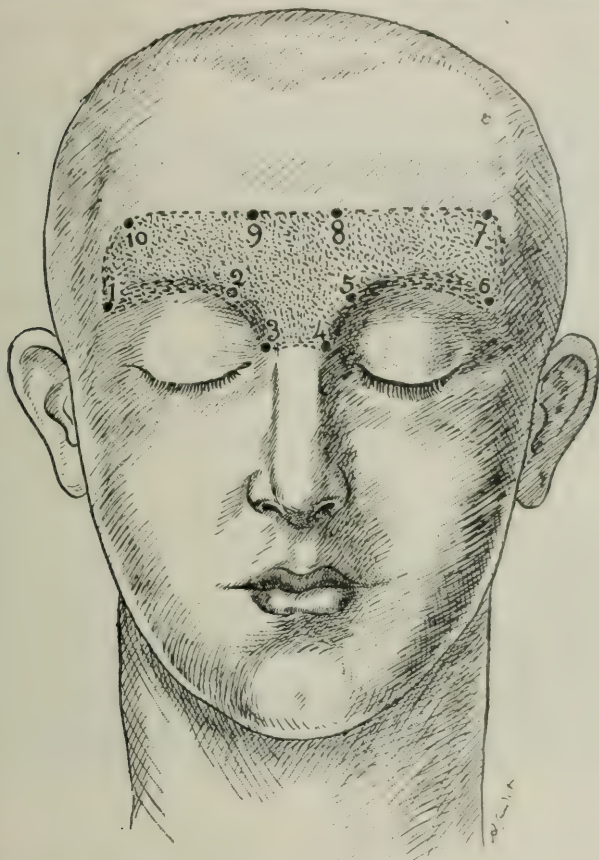


Fig. 8. Local anesthesia of both frontal sinuses.

The figures 1 to 10 show the exact points where the injections should be made to obtain anesthesia of both frontal sinuses.

The anesthesia obtained passes beyond the zone indicated.

cause, beside the dangers inherent to all narcosis, it is still more dangerous in operations on the maxillary sinus, and more particularly if the operation is bilateral.

The blood from hemorrhage which is abundant may go into the air passages and may necessitate tracheotomy. Moreover, it obscures the prognosis by reason of subsequent bronchopulmonary complications.

Instrumentation: A syringe (model according to the choice of operator) and a fine strong needle.

Anesthesia of one maxillary sinus: Twenty cubic centimeters of novocain, solution 1/200, to which is added six drops of adrenalin, solution 1/1,000. A 10 per cent solution of cocain hydrochlorate for anesthesia of the nasal fossa.

Anesthesia of both maxillary sinuses: Forty cubic centimeters of novocain solution.

ANESTHESIA OF ONE MAXILLARY SINUS.

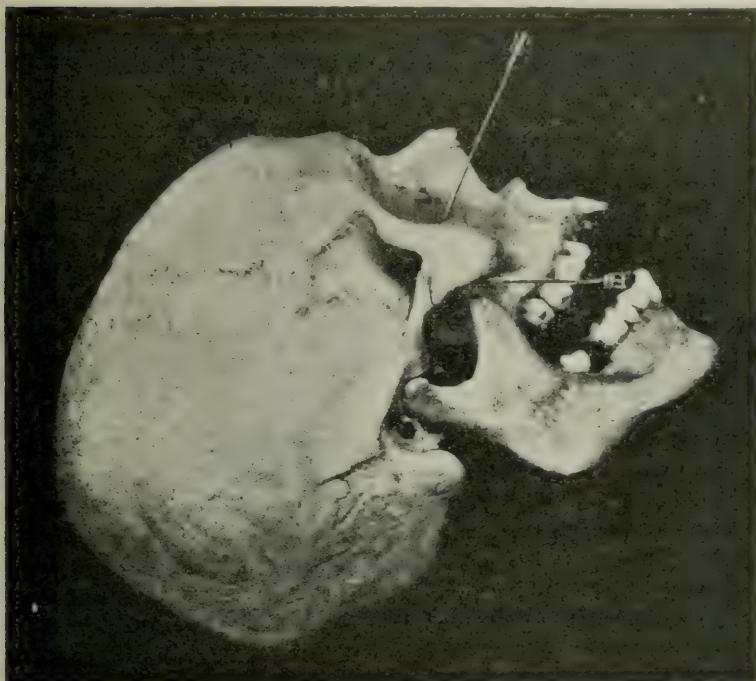
Technic. 1. Anesthesia of the Canine Fossa.—Inject two cubic centimeters along the line of mucous incision, from the canine to the first molar, inclusive. Inject four cubic centimeters subperiosteally in the canine fossa and throughout its extent.

2. Anesthesia of the infraorbital nerve (Figures 12 and 2). The surgeon should look for the infraorbital nerve externally. To do this he inserts the needle through the skin of the cheek at a point which corresponds to a perpendicular passing through the middle of the inferior border of the orbit and at least two centimeters below it. The needle is pushed to the bone, then, tattoo fashion, directing it toward the internal border and two centimeters below it. This causes the patient to have slight sharp pains, which indicate to the operator that he is on the right path. Finally, the needle suddenly penetrates the infraorbital foramen, touches the nerve and produces an exquisite flash of pain referred to the teeth. This is absolute proof that the object has been attained.

With the needle it is necessary to penetrate well into the foramen if one desires to obtund all the terminal branches spreading out from this region, and especially the last collateral branch, the anterior dental, which comes off a little behind the terminal thickening in the osseous canal. Four cubic centimeters are injected in the locality of this nerve, by which it will be completely obtunded. The infraorbital nerve can also be reached by inserting the needle under the mucosa

of the canine fossa and pushing it up toward the emergence of the nerve. It will not be best to use this method until the operator has become accustomed to looking for the nerve and is familiar with his task.

1



2

Fig. 9. Anesthesia of the superior maxillary nerve by the orbital and by the zygomatic routes.

This figure shows the position of the needles when they are in contact with the trunk of the superior maxillary nerve.

Needle 1 is passed by the orbital route.

Needle 2 is passed by the zygomatic route.

To reach the nerve it is necessary to thrust the needle under the zygomatic arch perpendicular to the external surface of the superior maxillary. Then by directing it upward and backward, it penetrates into the pterygomaxillary fossa where the nerve is found.

Needle 2 shows the last step.

3. Anesthesia of the Superior Maxillary Trunk.—This is the most important injection—in fact, theoretically anesthesia of the trunk of the superior maxillary nerve should be sufficient.

Practically this injection alone does not cause absolute anesthesia, but if it is well and successfully done, combined with anesthesia of the canine fossa and infraorbital, the anesthesia is excellent. We constantly obtain perfect anesthesia, in every patient, in the radical cure of maxillary sinusitis.

Two ways are at the choice of the surgeon in reaching the superior maxillary nerve at the large foramen rotundum: the zygomatic and the orbital route.

1. Zygomatic Route (Figures 9, 11 and 12).—Taking the zygomatic arch as a landmark, the needle is inserted through the skin under the lower border of the arch a finger's breadth in front of the ascending ramus of the lower jaw, and is pushed to the bone which is the external surface of the superior maxilla. The needle should be glided deeply the entire length of the latter, directing it upward and backward; thus the pterygomaxillary fossa is penetrated at the superior maxillary nerve. As soon as the nerve is reached by the needle point the patient feels a violent flash of pain comparable to a discharge of electricity, referred to the teeth. The maneuver is then successful, and four or five cubic centimeters of the solution are injected.

In this way the nerve is reached in the posterior wall of the pterygomaxillary fossa, near the foramen rotundum, and the sphenopalatine ganglion at the same time. Wounding of the internal maxillary artery is possible, theoretically; practically, it is very rare, and even if it happens there is no danger.

The above is an easy, certain method, free from danger, and has given us such good results that we now employ it almost to the exclusion of every other.

II. The Orbital Route (Figures 9, 10, 11, 12).—By this route (Chevrier) the superior maxillary nerve is reached at the sphenomaxillary opening. This opening, situated at the upper limit of the posterior wall of the pterygomaxillary fossa, has the large foramen rotundum at its posteroinferior extremity. Under the fibrous membrane which covers the opening in the living, completely separating the orbit from the

posterior wall of the pterygomaxillary fossa, the superior maxillary nerve gives off the most of its collateral branches—the palatine nerve, the posterior dental branches and the orbito-lacrimonal—before entering the inferior orbital groove.

Having taken as a landmark the inferior border of the

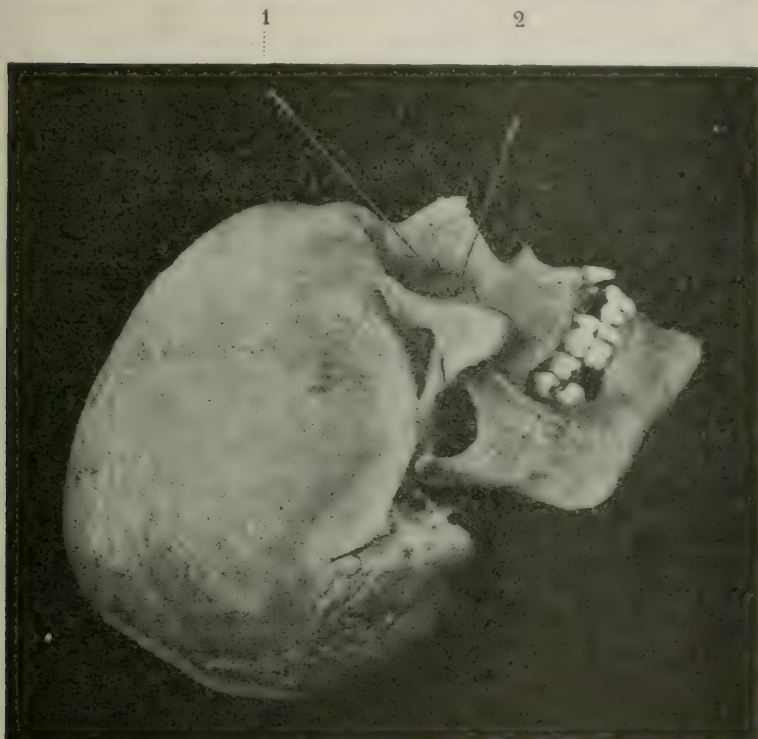


Fig. 10. Anesthesia of the trunk of the superior maxillary nerve by the orbital route.

We have thought it useful for the purpose of clearness to photograph this plan with the skull.

1st Step. The needle (1) is thrust perpendicular to the floor of the orbit.

2nd Step. The needle is glided along the floor of the orbit and lowered slowly until it becomes oblique (needle 2).

When the needle leaves the bony floor, it will enter the orbital fissure, if it is thrust deeply backward.

The maneuver is complete when the patient complains of lightening pains in the teeth.

orbit, at a finger's breadth from the external border, the needle is entered perpendicularly to the floor of the orbit (Figure 10). This done, it is necessary to glide it along the floor, lowering the needle progressively until the bony resistance ceases. Then the orbital fissure is penetrated. It remains only to force the needle, which was at first perpendicular to the orbital floor but is now oblique, into the vicinity of the superior maxillary nerve. The maneuver has succeeded when the patient feels a sharp flash of pain radiating to the teeth. Five cubic centimeters of solution are injected while progressively withdrawing the syringe.

The orbital route is more difficult than the other; it demands large experience and considerably impresses the patient, who fears for his eye. We have employed it for several years without trouble or accident (Canuyt).

Theoretically grave accidents are to be feared—false paths causing a lesion of the eyeball, phlegmon of the orbit, paralysis of the oculomotor nerves, etc. Practically there are none: the sole complication noted were the hematoma, the cause and mildness of which are easy to understand. Either the zygomatic route or the orbital route gives complete anesthesia of the jaw, upper lip, all the teeth, nasal fossa, lower eyelid and the sinus cavity of the side injected.

4. Anesthesia of the Corresponding Nasal Fossa.—The nasal fossa is carefully tamponed with 10 per cent cocain solution, and especially the inferior turbinate. If a few cubic centimeters of novocain solution remain, we inject it over the nasosinus wall in the inferior meatus, in order to have a perfect anesthesia at the time of penetration. Finally, we put a gauze tampon impregnated with 10 per cent cocain solution in the nasal fossa to remain during the whole operation.

Thus performed, anesthesia of the maxillary sinus is

1. Logical. The superior maxillary nerve is obtunded at its trunk. The nerve branches are obtunded by infiltration:

2. Rapid. Three punctures are made, and an ordinary anesthesia of the nasal fossa:

3. Methodical. It comprises four steps: Anesthesia (1) of the canine fossa, (2) infraorbital nerve, (3) superior maxillary nerve, and (4) nasal fossa.

This technic gives constant results.

ANESTHESIA OF BOTH MAXILLARY SINUSES.

It is necessary, first, completely to anesthetize one sinus, then the other, but not overlap them. Twenty cubic centimeters are injected for each sinus, a total of forty cubic centimeters.

1

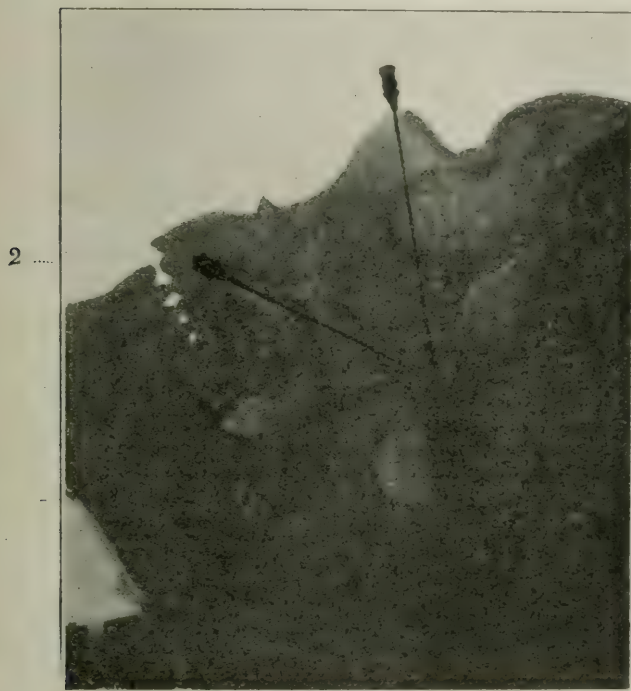


Fig. 11. Radiograph of a patient showing the method of anesthesia of the superior maxillary nerve.

Orbital route, needle 1. Zygomatic route, needle 2. This radiograph establishes that the two needles meet at the same point. We have thought it interesting to show in this way that the superior maxillary nerve can be reached in each of these methods: the orbital and zygomatic.

meters, Operation should be commenced on the sinus first anesthetized. It must be remembered that the radical cure of a double sinuitis is an extensive operation, rather long and

trying, and a hypodermic of morphin should be given when beginning the anesthesia.

ANESTHESIA FOR PARADENTAL CYSTS.

For paradental cysts the anesthesia should be made according to the following principles:

In the first place, it is very hard to know before operation whether the cyst is intra- or extrasinus. Errors on this point are frequent, and a cyst supposedly having no relation to the sinus cavity may be situated within it. Therefore we advise, save in exceptional circumstances, always to make a complete anesthesia of the maxillary sinus like that described for the radical cure of maxillary sinusitis.

Anesthesia of the canine fossa should be thorough, injecting about eight cubic centimeters, especially at the internal portion of the ala nasi and the ascending branch of the superior maxillary.

It is known that a paradental cyst, if it arises from an upper incisor or canine, pushes out of the upper lip and even into the nasal fossa. Therefore the anesthesia should be liberal in this region. Similarly, if the cyst arises from the first or second bicuspid or the first two molars, it will direct itself toward the sinus cavity. The tumor enlarges, pushing bone and periosteum before it, and goes toward the point of least resistance, which is the maxillary sinus; if the latter is intact, the cyst is extra-sinus; but if it is perforated we have an intra-sinus cyst, either membranous or bony, according to the case. Hence, from the viewpoint of local anesthesia, we must be ready for any eventuality and must have a complete anesthesia permitting completion of the operation, whatever surprises may occur.

To sum up, the technic of anesthesia is that for maxillary sinusitis with extensive infiltration of the canine fossa and internal aspect of the corresponding nasal fossa:

Advantages.—We shall repeat what we said of frontal sinus anesthesia—that they are those of local anesthesia in general, which need not be emphasized. With general anesthesia the radical cure of maxillary sinusitis is a grave, difficult and even dangerous operation.

Conclusion.—Never general anesthesia:

Indications.—(1) Radical cure of maxillary sinusitis, unilateral or bilateral.

(2) Radical cure of traumatic maxillary sinusitis, unilateral or bilateral.

(3) Paradental cysts, whether intrasinus or not.

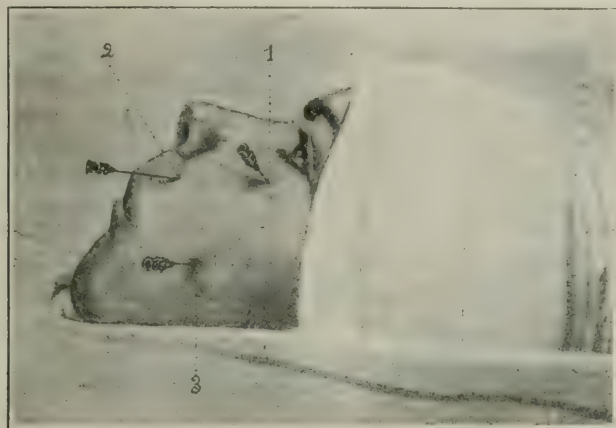


Fig. 12. Anesthesia of the maxillary sinus.

This figure shows a patient on the operating table prepared for an operation on the left maxillary sinus. The anesthetized region has been circumscribed by a sterilized operative field after an application of tincture of iodine.

Needle 1 has been passed by the orbital route and is in contact with the superior maxillary nerve.

Needle 2 is in contact with the infraorbital nerve.

Needle 3 has been passed by the zygomatic route and is in contact with the superior maxillary nerve.

(4) Foreign bodies and projectiles in the sinus.

It is absolutely necessary that the projectile be perfectly localized by a radiologist before operation. Moreover, if the localization is uncertain it is indispensable to operate under the fluoroscopic screen, a sure method, which saves the surgeon from a fruitless operation.

SALIVARY FISTULÆ.*

BY L. DIEULAFÉ.

In the surgery of civil life the clinical history of salivary fistulæ is altogether limited to that of the parotid gland and of Stenon's duct; the submaxillary gland by reason of its situation in the floor of the buccal cavity escapes traumatism, and in the case of fistulæ consequent upon inflammations of the submaxillary gland or calculi in Wharton's duct, the opening is made inside of the buccal cavity and offers no functional inconvenience.

In war surgery, with all the complex lesions of the maxillary glands and the floor of the buccal cavity and the extensive condition involving the bones and the soft parts, I have never seen a fistula of the submaxillary gland which indicated a special operation. Indeed, according to my previous studies and my observations in war surgery, I need describe only two varieties of salivary fistulæ:

- (a) Parenchymatous fistula of the parotid gland;
- (b) Fistula of Stenon's duct.

The masseteric region and the retromaxillary space, increased by the extension movements of the head, afford the parotid gland such a large surface in which to spread itself that there should be no surprise at the frequency of traumatic lesions of this gland: in addition to this, accidental traumatisms, surgical incisions, foreign bodies within the small ducts, calculi or abscesses may be the cause of fistulous lesions. In war surgery it may be implicated by wounds from various projectiles (bullets, fragments of shells); these fragments of shells of different caliber, sometimes more than one on the same gland, frequently cause lesions of the parenchyma of the gland.

A clean cut section of the parenchyma, especially if it remain aseptic, is restored spontaneously; but the contusion conse-

*Translation made in the office of the Surgeon-General of the Army from the original which was published in *La Restauration Maxillo-faciale*.

quent upon wounds by projectiles or suppuration breaks open the multiple lobules, attacks the intraglandular canals of appreciable caliber and the saliva pours out through a wound in the skin. In our men wounded in war attention to this flow is sometimes neglected at the beginning, because the phenomena of inflammation which result in the production of pus call for the use of dressings, under the protection of which the pathologic feature of the saliva discharge passes unnoticed. It is the same in cases of intraglandular collections; Daniel Mollière has shown that in these cases the fistulæ are preceded by a salivary tumor of slow development, with its volume varying from day to day, the skin covering of which becomes attenuated and reddened and ends in spontaneous ulceration, unless the surgeon may have been induced to make an opening.

When a parotid fistula becomes established after the retrogression of inflammatory phenomena or after the healing of the entry wounds made by projectiles or by operative wounds made to remove them, there may be noticed on the masseteric surface or in the sternomaxillary region a small reddish spot, depressed or acuminate, from the center of which a discharge of a clear viscid liquid appears, its flow limited to a few drops when the jaws are in a state of repose, but greatly increased during the movements of mastication. This is the real secretion mechanism of the parotid saliva.

It is only in cases where the fistula formation is of little importance or possibly where the suppuration of the parotid wounds is still more marked that there need be hesitation as to the diagnosis. In these cases, if the observation of the product of the secretion is not sufficient, the function of the gland may be stimulated by touching the lingual mucous membrane with a little vinegar or possibly by having the patient masticate. I have him chew a piece of hard bread for a moment. The characteristic limpid fluid is then seen flowing abundantly in real rushes through the fistulous place.

Sooner or later the diagnosis is always established; it may even thrust itself upon our notice, for when the other pathologic phenomena have all ceased this abnormal flow alone will remain. In this condition the patient himself makes the diagnosis, for the flow is produced only at the time of meals, and then he notes that his cheek is wet and even in certain cases

actually flooded by the liquid that streams even over his clothes.

In our wounded men who require attention on account of projectile wounds, it is only after the cure of the wound that the fistula offers any inconvenience; at the time when all dressings should be omitted the abnormal flow attracts attention and presents a new therapeutic indication. A few have been referred to us for salivary fistula, but in others who have been evacuated into the special services for facial or maxillofacial lesions, the salivary fistula was first discovered at our examination. Variations in the abundance of saliva flowing through the fistula depend upon the anatomic varieties of lesion; they may result from small lobules or from quite extended portions of the parenchyma with opening of important intraglandular canals.

The fistulous points may be multiple, but my own cases have been single, except in one case in which they were double. The site of the lesion necessarily varies greatly, since all of the region occupied by the parotid gland may be affected by a traumatism or may become abscessed on account of an intraglandular collection. In the latter regard, on account of the burrowing of the pus, the outlet of the pus may be external to the parotid region.

Parenchymatous fistulæ have a tendency to disappear spontaneously, and as in the surgery of civil life they hold only a small place as a clinical entity, but in war surgery the fistula may persist in view of the long periods of observation often necessary for the care required for the accompanying lesions.

I should point out that when the flow from the fistula ceases on account of spontaneous cicatrization the results are as good whether the lower jaw is allowed to be free and movable or fixed by means of an appliance for a fracture; and when the fistula persists after a long period it is found quite as frequently in patients with lockjaw or in those whose mouth has been kept closed for a long period for the fracture to grow firm as in those who have kept up the movement of mastication during the entire period.

It is not a very serious condition, but it is embarrassing, however slight the flow may be.

To what method of treatment must recourse be had?

Pressure. Excision of the Tract.—First of all, I call attention to the two procedures which have been shown to be inadequate and which consequently need not occupy our attention: Pressure, recommended by Jobert, and excision of the fistulous region, followed by suture.

Cauterization.—Cauterizations with nitrate of silver and with the thermocautery have given good results. For small fistulæ, with a slight flow, and consequently limited to small acinous groups, cauterization with delicate thermocautery points has given me good results. I make these cauterizations in two ways:

1. I cauterize the accessible parts of the parenchyma right through the tract of the fistulæ; if this procedure is to be effective two or three cauterizations at intervals of three or four days should result in the cure.

2. But these cauterizations may be inadequate and yet the lesions may be too insignificant to justify a surgical operation; the fistulous point can scarcely be noticed, for in the intervals between meals there is no flow, and it is only at the time of mastication that the clear drops rise to the surface and trickle down. In these cases I enlarge the orifice under local anesthesia and make an incision above and below the fistula (always in the direction of the fibers of the facial nerve at this place) and through this little opening I sear with the cautery all the surface laid open, curette or excise the cutaneous tract, and unite the cut surfaces with horsehair or silk.

In the slight cases my advice is always to begin with one or the other of these methods; they are recommended most particularly for small fistulæ consequent upon intraglandular suppurations.

Injectations of Oil.—Taking as his basis the atrophies of the pancreas obtained in the experiments of Claude Bernard by injecting fatty substance into its interior, Daniel Mollière undertook to cure parotid fistulæ by injecting aseptic oil into the injured lobule.

In two cases I tried injections of gomenol oil into the fistulous tract after failure with actual cautery, there was a very perceptible diminution in the secretion of the saliva through the orifice of the fistula, but this result was temporary. The secretion reappeared in a few days. These re-

sults do not justify any judgment as to the method, for it is not likely that the oil penetrated as far as the secreting acini.

Creation of an Intrabuccal Opening by Transfixion.—Fano and Duplay made an artificial passage within the mouth.

I have myself made an intrabuccal opening, in three cases where the fistula was situated over parts of the parenchyma upon the external surface of the masseter and adjacent to the anterior border of this muscle. I only followed the procedure which I used in fistulæ of Stenon's duct when this duct had a lesion in its posterior extremity, or when it was very tightly involved in hard cicatricial tissues or in tissue infiltrated with neoplastic formation.

This is the procedure that I advise:

A probe blunt at the end is inserted into the cutaneous opening, introduced through the tract without effort. The skin is cut in a lineal direction anterior and posterior to the probe. The end of the probe must not be displaced and must always mark the base of the fistula: this is the place where the collections of acini occur or where the small channels abnormally open, and this is the place which should become the center of the transfixion. Without leaving the mark the probe is directed obliquely forwards anterior to the mucous membrane in the chin portion, and pierces through the lesion in the parenchyma. With a fine bistoury, guided by the probe in order to open all of the tissues which separate the gland from the buccal cavity, we slide over the anterior border of the masseter, for if the muscle is pierced the new tract would be quickly closed by the muscular contractions. This forms a very oblique course across the gland, the genial aponeurosis, the bulb of Bichat and the mucous membrane. We press back anteriorly all the tissues that cover the masseter in order to avoid cutting the facial vessels. A drain is introduced into this tract, choosing one of from six to eight millimeters; in order to put it in place a Péan's forceps is introduced through the mouth and the opening made in the mucous membrane; the forceps are pushed to the opening in the skin, giving them free play; and the drain introduced and drawn toward the mouth. This drain is left for a considerable time in the vestibule of the mouth, and it is fastened by means of a thread which goes through it to the neck of a tooth, most often one

of the upper premolars. On the skin side the drain is cut off level with the parenchyma; the incision in the skin is sutured above after incision of the fistulous tract. The skin wound and the buccal cavity are kept very clean, irrigation through the drain, and after a few days the skin wound closes up. The drain is left in place as long as possible, ten, twelve or fifteen days, in order to obtain a well formed tract through the tissues.

After removal of the drain, it is still necessary to maintain the new opening through the vestibule of the mouth; thus an accessory excretory canal is created. In one of my operations, this canal did not remain permeable and the fistula returned.

Removal of the Auriculotemporal Nerve.—It has seemed rational to deal directly with the secretory nerves of the parotid gland. Before the war, Leriche had tried the removal of the auriculotemporal nerve in order to do away with the parotid secretion in a case of a fistula and also in a case of long standing hypersalivation in connection with a serious case of aerophagy. One of his pupils (Aigrot, Lyon chir., 1914, p. 242) was very enthusiastic about this therapeutic procedure. The experiments of Claude Bernard have, in fact, assigned to this auriculotemporal nerve the excretory part in the function of the parotid gland, and experimenters who have followed have confirmed this fact, although they have shown definitely that the secretory filaments from this nerve do not originate from the inferior maxillary nor from the facial, but from the glossopharyngeal through the intermediate nerve of Jacobson which supplies the small deep petrosal nerve at the otic ganglion. The proof is demonstrated by the following experiments: The excitation of the glossopharyngeal nerve in the cranium or of the nerve of Jacobson provokes secretion; on the contrary, intracranial section of the glossopharyngeal or of the small petrosal, or the extirpation of the otic ganglion suppresses the action of the reflex stimulants of the secretion. Similar experiments show that the inferior maxillary nerve and the facial nerve do not play any part in excretion.

The cervical sympathetic nerve also plays a part in the parotid secretion by the action of the external carotid plexus.

In spite of these scientific facts, in spite of the results ob-

tained by Leriche, I was persuaded a priori that the nerve mechanism of the parotid secretion was more complex, for within the parenchyma of the parotid gland the auriculotemporal nerve receives an anastomotic branch from the facial nerve. It seems to me that, if the auriculotemporal nerve had the preponderating rôle shown by Claude Bernard, it should not be the only one to act; it is indeed admitted that the sympathetic nerve has a rôle, and I believe that the facial must have one also.

I was quite prepared for failure to obtain an absolute drying up of the parotid secretion by the cutting of the auriculotemporal nerve alone; nevertheless the observations of Leriche were encouraging and all other means of healing were without result.

Through some investigations made upon the cadaver I ascribed a certain importance to a filament of the facial nerve which ran posterior to the condyle and was united with the auriculotemporal. There was no possibility of getting to the sympathetic plexus of the carotids without destruction of important tissue. It was therefore necessary to resort to the operation of Leriche.

It is advisable to make quite an extensive resection to avoid the deep plane of the carotid.

The technic is very simple. The operation can be made either under general or local anesthesia; local anesthesia must be reserved for cases where there is no inflammatory cicatricial tissue in the region of the nerve, and general anesthesia is preferable in the other cases.

An incision four centimeters long is made in front of the tragus, passing a little in front of the ear and down to the posterior border of the maxillary, a little below the neck of the condyle. Below the skin in front of the tragus, the temporal artery is carefully made out, its beats serving as a guide. Close behind the artery is found the vein in the conjoint sheath of the vessels, more difficult to find because it is not prominent like the artery which is pulsating. The nerve is found, separated from its surroundings, held with a pair of smooth forceps and its peripheral end divided. The nerve is always isolated by going down across the gland, and it must be disengaged very far down. In some dissections I have seen very clearly

the anastomotic branch of the facial nerve and have divided it separately. When the nerve is disengaged very far down outside of the gland, the forceps are given a twist and the nerve is coiled around them. The coiling is always done very gently while the nerve is stretched out, the parts farther down are disengaged and it is separated quite entirely by this motion of pulling out.

Looking for this nerve is made very difficult by hemorrhage. When local anesthesia is used a little adrenalin is put into the solution of stovain or cocain.

If an operation is done in a cicatricial mass, as I have done twice, it is very tedious, and the search for the nerve is difficult. It is necessary to invade the healthy tissue, find a branch of the nerve and follow it down to the trunk, and then isolate this carefully without dividing it too soon. The operation will be useless if all the gland filaments of the nerve are not resected, for the filaments returning to the gland as well as the anastomotic branch of the facial nerve would be spared.

What proves that the parotid secretion is, like the submaxillary secretion, a complex nerve phenomenon is the fact that this secretion does not stop instantly in those upon whom the operation has been performed.

I have tried the resection of the auriculotemporal nerve for fistula of the parotid gland variously situated, three times in healthy tissue, twice in cicatricial tissue. In every instance the secretion was continued after the operation and then disappeared.

In two cases it was necessary to complete the cure of the fistula by cauterizing, which had previously been without value. After the operation there still remains in the gland nerve connections which keep up the secretion and which are gradually checked by reason of the absence of stimuli from the auriculotemporal nerve.

But, on the whole, this operation led to the therapeutic success which was sought.

B.—FISTULÆ OF STENON'S DUCT.

The war has enriched the practice of surgery in the matter of fistulæ of Stenon's duct. In my volume on the surgical conditions of the buccal cavity (Vol. 8, *Traité de Stomatologie*). I

wrote: Wounds of the cheek assume quite a special character when they affect Stenon's duct, resulting, indeed, in a salivary fistula. These fistula appear as a complication of traumatic wounds, and may also originate in the course of surgical treatment, as, for instance, opening an abscess, removing a neoplasm or excising flaps for an autoplasty. They may also follow in the wake of inflammatory lesions or ulcerations due to salivary calculi. In 1911, I had one of my pupils (E. Lafont, Thèse de Toulouse) publish a comprehensive study of fistulæ of Stenon's duct, and he reported one of my cases in which the fistula was consecutive to an epithelioma of the cheek.

The present circumstances afford an opportunity for renewed study of the traumatic variety of these fistulæ. Among those that I have examined in men wounded in war, I have been able to establish various pathogenic conditions: (1) Very limited traumatism of the cheek from a fragment of a shell injuring the duct of Stenon directly and forming the fistula as the result of a lateral section of this canal; (2) extensive laceration of the tissues of the cheek by fragments of shells, followed by cicatricial contractions drawing together the duct of Stenon, obliterating its normal orifice and leaving the wound of the canal open upon the skin; (3) a traumatism, always from fragments of shells, which are of all projectiles most likely to produce serious wounds, after injuring the bones and soft parts and giving rise to inflammatory phenomena which open into and form abscesses and fistulæ in the duct of Stenon. The second class is the most frequent; of each of the others I have observed only a single case.

By reason of the frequency of facial lesions in the present war, their seriousness and the extensive destruction which they produce, I have the impression that the fistula in the duct of Stenon is a rare complication of them. These lesions are indeed followed by tough, cicatricial reparative tissue which often obliterates the wound in Stenon's duct; the cicatricial pressure, in this case, is converted into a spontaneous ligature of the canal and dries up the fistula by sclerotic transformation. There is from this fact a suppression of the excretory salivary canal, and secondarily, an arrest of the secretory function and an atrophy of the gland.

All the surgeons who have operated in the centers for

maxillofacial surgery have reported the sclerotic tendency of all cicatricial tissues, including the superficial skin lesions as well as the soft parts adjacent. I have often performed esthetic operations for cicatrices extending over a large portion of the face, which obliterated and stenosed into a sclerotic mass a wound which had injured irreparably the duct of Stenon, as it had cut off all the soft parts in this region. In the course of the dissection I did not even find a trace of this duct.

Relying on this spontaneous tendency to heal, I consider as absolute only such fistulæ as have resisted the test of time, and during the period of observation (most often depending on the treatment of other lesions) I stimulate the cicatricial process by hot cauterizations over the fistulous area as is done in fistulæ of the parenchyma.

But if the fistula is obstinate, all the symptoms of this lesion are present; most often a clear liquid is seen to exude along a fungus growth in the region of the masseter or the buccinator. This liquid is slight in quantity in the intervals between meals, but increases and becomes very abundant during mastication. An opening more or less visible leads to the passageway of Stenon's duct. The patient sometimes experiences a dryness in the mouth on the side where the fistula is located, but no trouble in nutrition results from it. Sometimes there is a kind of cystic sac at the level of the fistula which is easily emptied by pressure, causing the salivary liquid to flow out. This sac is due to the accumulation of the liquid between the wound in the duct and the opening in the skin. Its existence, in cases where intervention is necessary, is a valuable landmark in the formation of a new collecting channel.

The flow of the saliva through the abnormal channel is more abundant than in parenchymatous fistulæ, since the fistula carries by the principal collecting channel the entire amount of the parotid saliva. The quantity of saliva varies: A patient of Duphœnix discharged 70 grams in a quarter of an hour; one of Jobert lost several teacupsful in twenty-four hours; Mischerlich had a fistula which discharged only 60 to 95 grams in twenty-four hours; Beaunis states that the average discharge is 80 to 100 grams per day, while Hirschfeld reports a

quarter of a liter discharged at a single meal. Besides this, the quantity depends on whether the buccal end of the canal is still discharging or is completely cut away. The discharge occurs at the time of mastication, and it is by the action of mastication that it is brought into notice. Sometimes the saliva is accompanied by purulent secretions proceeding from an area of inflammation with which the fistula is connected; at other times the flow of saliva is the only symptom. The loss of a large quantity of a liquid which results from the recrementious secretion and which contains mineral salts, especially chlorides and phosphates, entails in the long run a weakening of the organism; besides, the abundance of the flow constitutes a real infirmity.

In order to treat the fistulæ of Stenon's duct, several procedures have been put into practice, as in the case of the parenchymatous variety:

Compression of the gland (Désault) or of the canal (Maisonneuve).

Injections producing atrophy (Daniel Mollière, Tussau, Cocchini).

The absolute immobility of the jaws (Moure, Piétri).

Cauterization of the Fistulous Tract.—Galen obtained a speedy cure by the application of a plaster; Ambrose Paré cured a soldier by means of aqua fortis and vitriol; Louis obtained a successful result by cauterizations with nitrate of silver, as also Dupuytren, Hergott, Lombard, Ravenel. There is every evidence that in order to obtain the cure of the fistula by simple cauterizations of the surface the fistula must be the result of a lateral wound of the duct, and this latter must remain permeable in its peripheral portion. It is thus that I explain a cure that I obtained upon a soldier whose wound, limited strictly to the buccinator region, led directly over the duct.

Simple Occlusion of the Fistula.—This treatment has given good results in recent fistulæ with permeability of the buccal segment of the duct. Malgaigne completely obliterated the orifice by means of thin goldleaf pasted on the skin with pitch; Rodolphi, Michalski, Champouillon, Tornley and Stokely have used collodium for this purpose.

The Suture of the Fistula.—The reuniting of the edges of the fistula after scraping them afresh may only be successful in the case of recent fistulæ with slight discharge; Morand, Sr., used it with success in one case.

The suture of the two ends of the duct (Nicoladoni, Dollinger) of its restoration by autoplasty (Bérard, Badiali), exceptional procedures which can be recommended only in cases where the divided ends of the duct are not retracted and where the surrounding tissues have remained free from sclerotic transformation.

The Reestablishment of the Permeability of the Anterior End.—This has in view dilation of the anterior segment so as to make sure of an easier flow of the saliva towards the mouth. The treatment with the seton may be mentioned (Louis, Morand) and that with the canula (Bérard).

The creation of an artificial passage towards the mouth. The following methods are used: Single puncture (Deroy), the seton (Monro, Larrey, Contavoz, Prompt, Jobert, Désault, J. L. Petit, Percy), the canula (Duphoenix, Atti, Higguet), the rubber drain (Pozzi, Kaufman, Reynier, Richelot, Decréton, Rey), the double puncture, a method intended to avoid the continued use of a foreign body and to effect an extensive loss of substance from the mucous membrane (the method of Déguise, and also that used by Béchar, Croserio, Gosselin, Trélat, Malgaigne, Le Fort).

The creation of an artificial passageway by transfixion has seemed to me applicable in most cases both for wounds in Stenon's duct and in the masseteric lobes of the parotid gland. I had at first recommended in the thesis of Lafont (Toulouse, 1911) a procedure which made an opening in the mucous membrane opposite to the zone of the fistula, and abandoned this opening after having cauterized the whole tract with thermocautery and having sutured the skin after incision of the cutaneous fistula. Since the war the method by transfixion which I have practiced has been enforced upon me either by the receding position of the fistula, which did not permit the treatment of the posterior end of the duct or by the sclerotic condition of the chin tissues which stood in the way of the examination of the duct.

After an incision in the skin at the very level of the fistula

and excision of the fungus tract, there is a landmark to the probe at the point in Stenon's duct or in the sclerotic tissues that have replaced it and that correspond to the cloaca, everted or not, which serve as an intermediate channel between the normal duct and the tract in the skin. From this point in the mucous membrane the creation of a very extensive opening connecting with all of the tissues is made with a bistoury. Péan's forceps are introduced by the buccal passage through the incision in the mucous membrane, by means of which a free passage is made for a drain going from the fistulous cloaca to the buccal cavity. On the skin side the drain is shortened so as to leave its end buried under the skin; this is reestablished in its continuity by direct suture of the incisions surrounding the fistula; on the side of the mucous membrane the drain is fixed in place by the means of a catgut. This drain should remain in place as long as possible, from ten to fifteen days. By this procedure the passage of the flow of saliva towards the buccal cavity is reestablished; I have made use of it four times and each time with success.

Transplanting of Stenon's duct has been practiced by Langenbeck, Goris, Ribéri, Delore, Princeteau, Schartz, Bouglé, Poenaro-Caplesco. I had no success in one case in which I tried this transplanting after removing an epithelioma from the cheek (Lafont, Toulouse, Thesis, 1911), but in two men wounded in war where I was able to take off the posterior end of the duct and join it to a healthy part of the vestibular mucosa I was entirely successful. For the success of this procedure the tissues thus treated must not be the seat of cicatricial process; I recommend it for all cases where an appreciable segment of the posterior end can be found and joined to a healthy mucous membrane.

The creation of an artificial duct at the expense of the mucous membrane has been proposed by Braun and Nicoladoni. It would be applicable in cases in which the posterior end of the duct is too short to be transplanted and in which the tissues of the cheek have not been altered by inflammatory or cicatricial processes.

The transfixion method is always easier.

Suppression of the salivary secretion is a method especially applicable in cases of parenchymatous fistulæ, and I

have already explained how I obtained this result by the resection of the auriculotemporal nerve. I would hesitate to advise this for a fistula in Sténon's duct, for the fistula situated over the duct, in my opinion, should always be cured either by transplantation or by transfixion.

Certain authors have secured suppression of the parotid secretion by imitating a process which nature has brought into play in numerous individuals who were mutilated about the face. In fact, in many wounded in whom there is no salivary fistula, Stenon's duct has been the seat of a destructive wound and has consequently been enfolded in a cicatricial process which has dried up altogether. This is identical with the procedure of ligating Sténon's duct (Viborg, Gollisen, Velpeau, Borel, Pelschinsky). Quite recently Morestin, after resection of the cicatricial tissues surrounding the fistula, tried torsion and suture of the central portion, thus obtaining a cure, without noticing any phenomenon of retention or painful tension on the part of the gland.

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

Diseases of the Ears in the Swiss Army.

SCHLITTLER, E.

Corr.-Bl. f. schw. Aerzte., 1917—No. 234—24.

On account of the geographic position of Basle, a large number of soldiers were stationed there ever since the beginning of the war. The ear diseases of these troops were carefully studied. The findings are of interest from different viewpoints.

From August, 1914, to August, 1916, 368 soldiers were treated; 17.2 per cent suffered from diseases of the external ear, 55.2 per cent from the middle ear, 24.8 per cent from diseases of the inner ear, and 2.8 per cent were exaggerations and simulations. Chronic affections were more frequent than acute. Acute diseases were rarer in military service than in civil life. Injuries to the ear are divided in, first, traumatic rupture of the drumhead; second, nerve deafness after trauma of the skull; third, the acoustic trauma caused by loud noises or detonations transmitted by means of the air. A traumatic rupture of the drumhead has red irregular margins during the first three or four days; later on it cannot be distinguished from a chronic perforation. Nerve deafness after fracture of the skull is usually combined with injuries to the sound conducting apparatus, or the vestibule and semicircular canals. The different tests can, of course, only be made in well equipped hospitals, which are also indispensable for treatment and the determination of questions of indemnification. It is important to know that a number of injuries which were overlooked at the first medical examination were afterwards attributed to minor injuries received in the service, and indemnities claimed. Slight deafness due to otosclerosis or spongifying can certainly be increased by overirritation. Sixty-seven of

the cases probably never had the hearing required for the service and ought to have been rejected at the first examination. The tuning fork tests give us valuable information. An interesting collection of cases is given of heredito-degenerative deafness (several sisters and brothers, hard of hearing), occupational deafness (blacksmiths, coppersmiths, etc.), of atrophy of the acoustic nerve after infectious diseases (typhoid fever) where the tuning forks gave definite information. We find here that in repeated examinations the results nearly absolutely coincide (the opposite is true of exaggerations and simulations). Combinations of middle ear deafness with nerve deafness called "dysacusis," show a loss of hearing in the upper as well as in the lower limit. There were five cases of typical otosclerosis or spongifying. Two of them were affected in one ear only. But even those ought to be excluded from military service since as a rule the disease affects both ears and is progressive.

Chronic suppurations of the middle ear were found in 59 patients, and 45 others had residues of old suppurations, together 28 per cent of all ear patients. The criterion whether a man with a perforation should be rejected or not, is the position of the perforation. It is comparatively insignificant if a man with a central perforation is accepted in spite of otorrhea. It is quite a different question in marginal perforation. Space does not permit mention of the many interesting points which are brought out in connection with this question. The last group are those patients with exaggeration and simulation. Repeated tuning fork tests and Lombard's test usually revealed the true condition very soon. One case was more difficult and more serious. The man tried to evade military service by simulating deafness. He was convicted and sentenced by court martial to three months' imprisonment and three years' loss of civic rights. The conviction was based on eight points:

1. His speech was as in a normal person.
2. Lombard's test: He raised his voice when the noise instrument is put in both of his ears during loud reading.
3. He did not turn around when a heavy body is dropped on the floor behind his back, and does not act on motions, for example, if by motion he is ordered to leave the room.

4. A siren was heard with open ears, and not when a cork or a perforated cork is inserted in both ears.

5. The man began to swallow when the physicians talk in a low voice about court martial and prison.

6. At night he woke up repeatedly from low whistling or conversation, even from simple coughing of a neighbor. If anyone told a joke, he laughs too. In awaking he once answered a question promptly and even repeated the question.

7. An acquaintance from his home town did not know that he was deaf, and a number of written certificates testify the same.

8. The functional tests with whistles and tuning forks were unreliable. The few sounds that were heard one day were not heard the next. The functions of the vestibular apparatus were normal.

During the trial before court martial he suddenly regained his hearing.

J. Holinger.

Acute Mastoiditis as a Complication of Infectious Diseases. Based on a Study of One Hundred and Twenty-three Cases in the Base Hospital at Camp Shelby, Miss.

LATHROPE, GEORGE H.

J. Am. M. Ass., Chicago, 1918—LXXI—451.

The writer presents the following conclusions: Imperfect as this study is in many respects, the following conclusions seem to me justified from the facts and analogies presented:

1. The army camp in question appears to have suffered this past winter an "epidemic" of acute mastoiditis.

2. This exhibition of mastoid infections is only one expression of the general streptococcus incidence in the camp.

3. The latter streptococcus invasion, in turn, is but a side-show in the very widespread wave of streptococcus disease throughout southern army camps.

4. It is peculiar in two points: (a) The dominant organism is the streptococcus viridans, and not a hemolyzing streptococcus, as appeared elsewhere; and (b) its chief expression is in the form of an unusually severe involvement of middle ear and mastoid tissues.

5. Measles played a prominent part in giving the streptococcus a start in its work, and stands by itself as an etiologic factor in the development of the severer types of mastoiditis.
Emil Mayer.

Wounds of the External Auditory Canal With Resulting Stenoses and Atresias.

ROZIER, J.

Rev. hebdomadaire de laryngologie, etc., 1918—XXXVIII—385.

Some fifty cases of atresia and stenosis have been operated on by Moure and his assistants. Eight of the cases are here described in detail. In brief, Moure's method comprises three important steps: (1) Enlarging the bony auditory canal by chiseling off the posterior wall down to the tympanic cavity; (2) autoplasty of the membranous canal, Moure's method, to obtain as large a meatus as possible; (3) careful attention to postoperative dressings.

Success was the rule, but one failure and two partial failures are described to show the difficulty sometimes encountered in maintaining the patency of the canal.

A. Miller.

Report of a Case of Spontaneous Rupture of the Lateral Sinus Five Days After Mastoid Operation.

By COATES, GEORGE M., AND DOYLE, JOHN H.,
Survey of Head Surgery, Surgeon General's Office,
1918—I—143.

The case reported herewith was one of great interest to us, and in respect to the spontaneous rupture of the lateral sinus is unique in our experience.

The features of the case were the presence of a streptococcus hemolyticus septicemia, and the rather prompt recovery of the patient with the formation of only one metastatic abscess.

It is needless to speculate upon the outcome if the sinus had ruptured at any other time than during a dressing when both of us were present and when immediate measures could be taken for control of the hemorrhage.

Mrs. H., age twenty-four years, wife of an enlisted man in the 28th Division of the U. S. Army, came to the clinic of the Base Hospital, Camp Hancock, Georgia, on April 20, 1918, complaining of bilateral earache following an acute rhinitis of a few days' duration, which she thought was induced by bathing in one of the near by swimming pools.

On examination, both tympanic membranes were found to be congested and bulging; there was no mastoid tenderness or sagging of the posterior canal walls.

Immediate incisions evacuated a small amount of pus from each middle ear. On the following day the discharge was free, thick and yellow, and as the earache persisted the incision on the right side was enlarged.

April 24th. Much more pain, some mastoid tenderness on the right side; right external canal somewhat contracted and discharge lessened. A double myringotomy was again performed.

The condition continued without much change until May 6th. She had been sleeping badly, and was very nervous and excitable, and, at this time, was evidently suffering considerably. The evening temperature was 102° and there was a history of a chill.

She was now removed to the Base Hospital, where a blood count showed a leucocytosis of 12,200. The right canal was more contracted than before, and the middle ear discharge scanty. On May 9th, the X-ray showed a hazy mastoid process and the white blood count was 13,000.

Under ether, a thorough simple mastoid exenteration was performed. There was no great destruction of the mastoid cells, but pus was found filling a rather large tip cell, and the cells adjacent to the antrum were necrotic.

The sinus was placed very high, encroaching greatly on the posteroinferior wall of the antrum, the latter being opened with great difficulty and only after removing a considerable area of the necrotic sinus plate. The sinus itself appeared normal, so, after a thorough exenteration of all mastoid cells the wound was swabbed with a 2 per cent iodine tincture and allowed to fill with fresh blood; after placing a small rubber tissue cigarette drain in the antrum. A continuous up-end mattress suture of silk was used for closure, after the method

of White of Washington, D. C. The temperature after operation was 100°, with a good pulse.

On the following day the temperature had risen to 101°. The external dressings were removed and the line of incision was wiped with a 5 per cent solution of dichloramin-T in chlorcozane oil. There was some discharge from each middle ear, and the hearing was markedly impaired. No vertigo or nystagmus was present, and no chills or delirium had been recorded since admission to the hospital. Bacteriologic report on the pus taken at the time of operation was that the streptococcus hemolyticus was present in pure culture.

Two days later, May 12th, there was a sudden rise of temperature to 106° (rectal), and the white blood count was 22,000. There were no eye symptoms, and the lungs were normal. An examination of the pelvic organs showed nothing abnormal.

May 13th, the temperature was 106.8° (rectal) at 5 a. m., and remained between that point and 104° all day. The patient complained of chilly sensations, but no true rigor was observed. The mastoid wound was healing perfectly at the skin incision, and the blood clot was not infected, a very small amount of middle ear discharge coming through the cigarette drain.

The left ear discharged slightly, but was evidently not the cause of the fever.

The patient looked white and pasty, and a Murphy drip was used, giving two quarts of dextrose solution in twenty-four hours. The urine was normal, showing only a few hyalin casts. Stitches were removed, the skin wound holding perfectly.

May 14th, her condition remaining much the same, the mastoid dressings were removed and the cigarette drain was lifted out without effort. Sharp venous bleeding followed within a minute, but not immediately, being controlled by packing with iodoform gauze tape, thereby displacing most of the partially organized mastoid clot. The loss of blood was not great, and the temperature soon dropped to 100° pulse remaining good.

May 16th. The blood culture was positive for the streptococcus hemolyticus, and the temperature continuing to run an

uneven course, the right internal jugular vein was exposed, ligated and excised up to the facial. At the same time the mastoid packing was removed, but the hemorrhage was too profuse to permit of any further investigation of the lateral sinus. For the next few days the temperature gradually steadied down, though there was a daily rise to around 102°. The neck wound healed with practically no infection, and the packing from the mastoid cavity was finally removed without recurrence of bleeding on the seventh day. Hearing had improved markedly and both ears were nearly dry. In the meanwhile, however, the patient had complained of pain and tenderness in the left gluteal region, though nothing could be felt there.

On May 25th, the temperature was again between 102° and 105°; the neck wound was closed; both middle ears were dry, with 20/20 hearing, and the mastoid wound was rapidly filling in by granulation, although it promised to be unsightly owing to the hurried and long continued packing.

On June 1st, a metastatic abscess of the left gluteal region was diagnosed, and under ether was incised and drained by Major R. T. Schlueter, Chief of the Surgical Service, two ounces of creamy pus being evacuated. The mastoid wound was perfectly clean, due to the continuous use of dichloramin-T, so, under the same anesthesia, we did a plastic closure, liberating the skin flaps and bringing them together with silk, leaving a small opening for drainage at the lower end. This closure held well and the wound remained clean until final healing on June 13th, with very little deformity. At this time the patient was discharged in good health, strong and well, and proceeded to her home in the North.

Any review of the case must suggest the query as to just what the pathologic process was. In the first place we had a mild mastoid infection, although it had been very slowly progressing for about twenty days from the initial middle ear onset. The causative agent was the streptococcus hemolyticus which was later found in the blood. At the time of the operation, a necrotic sinus wall was removed, revealing an apparently healthy sinus, which bled profusely when it later ruptured; while on the other hand, the internal jugular was not thrombosed below the facial tributary. It would

appear, therefore, that it was a case of jugular bulb thrombosis, and that the pressure of the blood in the sinus above the clot eventually ruptured the weakened sinus wall, unsupported by the bony plate which had been removed. The cigarette drain into the antrum of necessity lay in contact with the exposed sinus for five days, and the hemorrhage followed soon after its removal, although it was lying loosely against the sinus.

The question arises whether the slight pressure, due to the contact for five days of the rubber drain, caused the weakening of the sinus, or whether the already disease weakened wall was kept from giving way by even the slight support afforded by the drain.

Intimate Relation Between the Ear and the Eye as Shown by the Barany Tests.

LANGDON, H. MAXWELL, AND JONES, ISAAC H., Arch. Ophth., New Rochelle, N. Y., 1918—XLVII—348.

Ocular equilibrium is dependent on normally functioning ears. Tonic impulses from the right ear continually tend to draw both eyes to the left, and from the left ear to the right. The anode applied to the right ear draws both eyes to the right with resulting nystagmus to the left, while the kathode has the opposite effect. So complete is the control of the ear over the eye that a nystagmus of any type and in any direction may be produced "to order" by appropriate ear stimulation. The eyes are always drawn in the direction and in the plane of the lymph movement. The nerve paths between the ear and the eye muscles, and between the ear and the cerebral cortex and the following, according to our present knowledge:

I. The fibers from the horizontal semicircular canal pass through the eighth nerve, enter the brain stem at the junction of the medulla and pons, and continue directly to Deiter's nucleus and there divide into two pathways.

a. The vestibulo-ocular tracts concerned in the production of nystagmus. These go from Deiter's nucleus to the posterior longitudinal bundle, through which they pass to the various eye muscle nuclei, from which, through the third and

sixth nerves they are distributed to the eye muscles themselves.

b. The vestibulo-cerebello-cerebral tracts responsible for the vertigo. From Deiter's nucleus this path enters the cerebellum through the inferior cerebellar peduncles to the three vestibular cerebellar nuclei of the same side, from which it proceeds upwards through the superior cerebellar peduncle and continues to the cerebral cortex from both sides, but more particularly the opposite side, through the crura cerebri. The cortical areas which receive these fibers are postulated by Mills to be the posterior portion of the second temporal convolutions adjacent to the cortical areas for hearing.

II. The fibers from the vertical semicircular canals pass through the eighth nerve and immediately ascend into the pons, and at a point above its middle they have a division into two pathways, similar to that of the horizontal at Deiter's nucleus.

a. The vestibulo-ocular tract, the fibers entering the post-longitudinal bundle to be distributed to the eye muscles.

b. The vestibulo-cerebello-cerebral tract reaches the cerebellum through the middle cerebellar peduncle, entering the cerebellar nuclei of the same side; from this point the pathway is identical with that of the fibers from the horizontal canal, through the superior cerebellar peduncle to the cerebral cortex of both sides.

The nystagmus tract is the one of greatest interest to oculists. Its integrity proves a supranuclear lesion in cases of conjugate deviation of the eyes. In cases of muscular paresis it is suggested that electrical ear stimulation might stimulate the weakened nerve fibers.

—Survey of Head Surgery, Surgeon General's Office.

Three Cases of Nystagmus in Concussion.

MOREAU, F., *Ann. d'ocul.*, Paris, 1918—CLV—236.

Case 1.—An artilleryman, nine months before, had been shocked by the explosion of a 210 shell. Coma followed for eight hours. There were no wound, otorrhagia and epitaxis. Nystagmus, however, resulted and was not modified from the beginning. It was spontaneous, with oscillations of amplitude varying from 100 to 140 a minute, the short contraction

produced by the dextrogyres in looking to the right, by the levulogyres in looking to the left. In looking down, the oscillations had a slow pendular rhythm; in looking up, there was almost a tremulousness of the globe; in convergence, the oscillations became short, of very small amplitude. Neither darkness nor a reclining position altered the character of the nystagmus. Lumbar puncture had no influence. Horizontal oscillatory movements of the head were present, yet it could not be affirmed that they were synchronous with the movements of the globe. In spite of the absence of ocular lesion the visual acuity was scarcely 0.2 right and left. The vision was not modified in looking upward or downward. Accommodative asthenopia appeared rapidly. With the stereoscope there was intermittent fusion; with the diploscope, absence of binocular vision. Visual fields and chromatic sense were normal. There was no other result of the trauma than the nystagmus. Hearing was normal and otologic examination revealed no affection of the vestibule.

Case 2.—Two years before, the patient had been buried by the explosion of a shell. There was no wound. He was evacuated to the hospital with complete paralysis of the limbs and a state of obnubilation with nystagmus. Following several lessons in reeducation, gait improved and became normal rapidly.

The nystagmus appeared immediately after the trauma. At the ambulance station the patient saw the rows of beds dance. The nystagmus had never changed. The oscillations were large, rapid, horizontal, spontaneous, continuous. The visual acuity was 0.25 right and left. The patient has at times had brief attacks of visual clouding (obnubilation). There was no ocular lesion; no fusion with the stereoscope; but there was a homonymous diplopia. The aurists, after several examinations, could not ascribe a vestibular origin.

Case 3.—Concussion twenty-one months before by the explosion of a shell. No wound present.

There was a nystagmus with vertical oscillations which were not modified by changes in the position of the head. Palpation through the closed lids revealed the persistence of the oscillations of the globe. The rhythm was regular. Several lumbar punctures did not modify the nystagmus. Ac-

companying the movements of the eyes there were present vertical oscillations of the head, the synchronous character of which it was difficult to fix. There was also a homonymous diplopia; no ocular lesion; visual fields were normal; pupils normal; vision right, 0.5; left, 0.7.

Otologic examinations by two aurists revealed probable lesions outside of or below the labyrinth, the latter being intact. The patient was able to stand only with crutches, and to walk with their aid by pushing forward his legs.

In these three cases of nystagmus, the labyrinth could not be held responsible by otologists nor could a localization be established by neurologists. They followed trauma, were permanent, constant, without variation, lasting one year, twenty-one months and nine months, respectively, and were not influenced by lumbar puncture. There was a reduction of vision, not progressive, and without ocular lesion, the case of vertical nystagmus being the least marked. To this diminution of vision there was added, in two of the cases, a homonymous diplopia which persisted without variation since the first examination. Finally the writer does not attempt a pathogenic hypothesis nor identify the facts of the syndrome with Deiter's nucleus.

—Survey of Head Surgery, Surgeon General's Office.

Some Phases of the Vestibular Nerve Problem.

DUNN, JOHN, Arch. Ophth., New Rochelle, N. Y., 1918—
XLVII—354.

If the head is held erect in the so-called optimum position, and is turned to the right, the eyes move to the left, there is an excess of movement in the endolymph, confined to horizontal canals, and there are necessary body and extremity adjustments. These three form a trinity called into existence by every movement of the head on the vertical axis. The proper correlation of these three elements is brought about by the cerebellum. Its function is to make possible the exact performance of any desired—i. e., willed, motion, but it does not originate movements. In addition to the stimuli originating in the cerebrum to accomplish an act or voluntary movement, the cerebellum receives stimuli from the sensory nerves

supplying the muscle, joints, etc., affected by the movement, which stimuli reflexly cause the act or movement to be prolonged until another willed movement takes its place. The adjustment of the body and extremities, the ocular movements, and the aroused vestibular sensations are independent of the will and beyond its control when once the machinery of the act—e. eg., turning the head, has been set in motion. To this end connections have been developed between the cristæ of the horizontal canals and both the cerebellar cortical centers and the vagic ocular centers. A similar connection has arisen between other of the canals and the cerebellum and optic centers to permit other movements of the head. Only those cerebellar centers respond to vestibular peripheral irritation which have been developed along with and are of a necessity a part of the vestibular trinity complex—i. e., these centers whose hyperexcitation produce body falling and past-pointing of the type made manifest by irritation of the cristæ. Others are directly associated with the cerebral motor cortical centers.

The primal eye was a part of the vegetative system and was under the control of the vagus centers. In its development it has also come under the control of the will, so that excitation of the vestibular terminals result in impulses to both the vegetative ocular nuclei and the voluntary nuclei. Thus the nystagmus has a double element. The one results from a hyperexcitation of the primary stem centers so that it is possible to have a nystagmus, even in deep unconsciousness. The other results from overexcitation of the centers which have developed as the result of willed control over the external ocular muscles. Their manifestations follow the same rules which determine the direction in past-pointing and body falling. When the eyes are fixed and the head is moved the eyes move in the opposite direction with a slow, pendulum-like movement, but when the head is fixed and the eyes move, the movement is jerky. The former is under the control of the voluntary nuclei. In nystagmus the slow movement represents the response to irritation of the gavi nuclei. The rapid movement represents a post-pointing of the eye and necessitates an element of the will for its performance.

Movements of the eyeball, whether normal or pathologic—

e. g., albinism, do not give sensation of the movement of external objects, but vestibular nystagmus always does. Two cases of vertigo are described and analyzed, and lead to several questions: What are the functions of the utricle and saccule, and why is the vestibular never divided so that some fibers go to the utricle and the vertical canals, and some to the saccule and the horizontal canals. Why should nausea and vertigo be a sequence from the ear? Do there pass centralward from the cristæ, fibers some of which are destined to arouse stimuli in the oculomotor centers, others to assist through the cerebellar centers in stabilizing the head. spinal cord and joints of the extremities for the fullest performance of willed movements of these parts? Can nausea be induced by disturbance of the cristæ nerve end alone, or it is a manifestation of disturbance of the otolithic branches of the saccule? (and utricle?) What are the effects upon the endolymph, beyond the semicircular canal, of disturbances of the endolymph within them?

—Survey of Head Surgery, Surgeon General's Office.

Brain Abscess With Autopsy Findings.

WOOD, GEORGE B..

Survey of Head Surgery, Surgeon General's Office,
1918—I—193.

1. This case is reported because of the large size of the abscess, its relation to a frontal sinusitis and because of the interesting pathologic findings.

2. Private S. M., 21st Company, 154th Depot Brigade, age twenty-five years, white, was admitted to the U. S. Army Base Hospital, Camp Meade, on July 23, 1918, with a diagnosis of acute frontal and maxillary sinusitis, right side.

History.—He entered the service one month previous to his admission to the hospital and, according to a letter from his sister, although he had never been very robust and suffered more or less from gastric disturbances, he had never had any headache or other symptoms of sinus trouble up to the time of being drafted. Patient stated that he had suffered from headache occasionally since being in camp, but not severe enough to report to sick call. On July 14th, although he had

a "cold in the head," he received his third typhoid inoculation. That afternoon he had a sharp pain over the right eye, which kept up more or less constantly until his admission to the hospital. Also he developed a fairly copious mucopurulent and bloody discharge from the right side of the nose.

Family History.—Negative.

Personal History.—Smallpox at nine years of age, chickenpox at eleven years of age and gonorrhea eight years ago.

Condition on Admission.—He had severe right frontal headache, the pain extending into the right eye. His mentality was good, though he seemed somewhat apathetic. Heart and lungs were normal, as were also the abdominal viscera. Temperature was 101° , pulse 78, and respiration 22. Leucocyte count 15,000, 67 per cent polymorphonuclears, 31 per cent small mononuclears, and 2 per cent large mononuclears. There was marked edema over the right frontal sinus with possible fluctuation, just above the external limit of the eyebrow. The upper lid was only slightly edematous.

The left nasal fossa was normal, and the right nasal fossa was also normal except for a small drop of pus under the anterior end of the middle turbinate. The X-ray examination showed the right frontal anterior ethmoidal and maxillary sinuses cloudy and the left side clear. The frontal sinus was very large, extending almost to the end of the eyebrow, with an extension running well back over the orbital cavity. On July 24th, under cocain anesthesia, a Mosher intranasal anterior ethmoidectomy was done and the right frontal sinus freely opened. A copious discharge of pus took place, and the patient experienced immediate relief from headache. Temperature that evening was 100.6° , puls 88 and respirations 20.

On July 25th, the edema of the upper eyelid was more marked, and there was distinct fluctuation just above the external limit of the eyebrow.

An external frontal sinus operation was done under ether. A subperiosteal collection of pus was found external to the bone without any recognizable communication with the frontal sinus cavity. The external abscess was thoroughly opened by an incision which was carried upward from the outer part of the brow incision. The greater part of the external wall on the frontal sinus was removed and a large opening was made

into the nose by rasping down the nasal process of the superior maxillary. A large rubber drainage tube was placed in the sinus and brought out the nose. The brow incision was closed and gauze drainage inserted into the external abscess cavity.

July 26, 1918. Patient comfortable, temperature 101° , pulse 90; free drainage from nasal tube.

July 29, 1918. Wound apparently doing well, except that there was some retention of secretion in the external angle, necessitating the insertion of a rubber drainage tube. Highest temperature 101° , pulse 99.

July 31, 1918. First noticed evidence of mental sluggishness. Evening temperature 99° , pulse 62. Leucocyte count 16,000, polymorphonuclears 67 per cent, small mononuclears 24 per cent. Culture from frontal sinus showed the staphylococcus albus and streptococci. Lumbar puncture showed the spinal fluid to be under slight pressure with a cell count of 64 per c. mm., and there was a slight globulin reaction.

August 1, 1918. Marked mental depression, with slight headache. Pulse distinctly slow, varying between 48 and 54, temperature 98 to 99.4 degrees. Vomited once after eating and passed urine involuntarily. Leucocyte count, 18,400.

An exploratory operation was done by Major Charles H. Frazier. The anterior wall of the frontal sinus was completely removed. A moderate amount of pus was still present in the sinus, and there was granulation tissue in the region of the nasal opening and toward the external angle of the sinus. After enlarging the perpendicular incision upward, the skull was trephined one inch above the upper limit of the frontal sinus, slightly external to the midbrow line, and the dura uncovered downward until the internal wall of the frontal sinus was reached. There was a small osteomyelitic dura at the upper margin at the internal wall of the sinus, and beneath this the dura seemed somewhat thickened and congested. There was no extradural collection of pus, but there was little if any pulsation of the dura. A hypodermic needle was introduced through the dura with negative results. The wound was packed with iodoform gauze and one or two sutures inserted through the brow incision at its inner end. After the operation the pulse rose to 78, but rapidly dropped during the night to 60.

August 2, 1918. Patient comatose, though he can be partially aroused. There are periods of extreme restlessness with some jactitation. Involuntary urination. At the suggestion of Major Frazier, a lumbar puncture was done, showing spinal fluid under pressure. Patient, however, went into collapse, and in spite of artificial respiration and atropin and adrenalin in the cardiac muscles, died with respiratory failure.

3. I am submitting herewith, as an enclosure, a report of the autopsy done about two hours after death by the Chief of the Laboratory Service.

The pathogenesis of the brain abscess in this case is somewhat obscure, though the probabilities are that it was secondary to the frontal sinusitis. It is also probable that the abscess had been forming during a considerable length of time, three or more weeks, as there was a distinct limiting wall, as shown by the marked polymorphonuclear infiltration surrounding it. It would seem impossible that an abscess as large as this one was, with a definite limiting wall, could have developed after the acute symptoms of his frontal sinus were first manifested. Hence we are inclined to believe that the acute attack was superimposed on an old lesion, though when the sinus was first opened the appearance suggested an acute process more than a chronic one. There was very little thickening of the lining mucosa, and granulation tissue was present only around the opening into the nose and externally in the region nearest to the external abscess. At that time a careful examination of the internal wall of the sinus failed to reveal any area of necrosis, though at the last operation a small osteomyelitic spot was found leading directly to the thickened dura, and it is possible that this existed at the time of the first operation without its being detected. The difficulty of detecting the point of invasion through the bone in this case was demonstrated by the failure to find any communication between the frontal sinus and the external abscess, although a most careful search was made for such an opening.

This case further demonstrates the difficulty in diagnosing an abscess of the frontal lobe in an early stage. The first symptoms indicative of intracranial lesion were first noticed only two days before his death. Although on admission the patient seemed somewhat apathetic, there was no distinct

mental sluggishness, and there was no slowing of the pulse until August 31st. Further the headache from which he suffered severely on admission to the hospital, was entirely relieved by the intranasal operation and returned only, and that to a slight degree, on the day before his death.

While it is unfortunate that the abscess was not found when the frontal bone was opened, it is doubtful whether more than temporary relief could have been obtained, as a microscopic examination of the brain tissue showed that throughout the whole frontal lobe there was marked cell degeneration, focal necrosis and polymorphonuclear infiltration. The bacteriologic examination of the abscess contents was of special interest, because there was found in connection with the streptococcus viridans a fusiform bacillus, which could be cultured only by anaerobic methods and which has lately been found quite frequently in abscesses of the brain.

AUTOPSY REPORT, by GEORGE S. MATHERS, Captain, M. C.

1. Herewith is enclosed the autopsy report on S. M., Private, 21st Co., 154th Depot Brigade, who died August 2, 1918, at the Base Hospital, Camp Meade, Md.

2. Autopsy A-48, S. M., Private, 21st Co., 154th Depot Brigade, made August 2, 1918.

The body is that of a moderately well nourished young white male, weighing about 130 pounds and about twenty-five years of age. Body heat was still present and the postmortem rigidity had not appeared.

The hair was cut short. There was a large blood stained surgical dressing over the right frontal region of the head. Over the right eye, just above the supraorbital ridge, there was an open surgical incision. This incision is "T"-shaped, with the lateral line of the "T" being parallel with the right supraorbital ridge and the perpendicular line extending upward about five centimeters over the frontal protuberance. The incision extends through the soft tissues, and there was an absence of the frontal bone in the region of the right frontal sinus. The edges of the wound are covered with a new granulation tissue, and there is some seropurulent material in the wound. A long iodoform gauze pack was recovered from the upper line of incision, which had been closed

with three silkworm gut sutures. The tissues of the scalp in the region of the operative wound are markedly edematous.

On opening the skull, the dura is hyperemic. The brain in the right frontal region is swollen, pale greenish yellow in color, and fluctuates. The dura is attached to the brain at one point—the cerebrum near the upper end of the surgical incision, and when the attachment is broken a thick greenish yellow purulent material exudes from the brain. There is no gross evidence of meningitis, except where the cortex is attached to the meninges as described above.

There is a very small amount of yellow purulent material in the left sphenoid sinus. The left frontal sinus, the middle ears and antrums are unchanged.

The brain is about normal in size and symmetrical, with the exception that the superior frontal surface is flattened and fluctuates. The external appearance of the brain substance in this region is a yellowish green color and has a semi-translucent appearance. On section a large abscess was found in the right frontal lobe extending from the anterior tip of the lobe to the plane of the central fissure. In its longest diameter it is about 7.5 centimeters, and in its transverse diameter it is about 3 centimeters. The wall of the abscess is blood stained, and there are marked gross changes in the brain tissue in the region of the abscess. The abscess cavity contains a thick greenish yellow pus. There were no other gross changes noted in the sectioning of the brain.

Microscopic examination of the brain tissue in the region of the abscess revealed a marked polymorphonuclear infiltration of the cortical substance forming the wall of the abscess, which became less pronounced as the external surface of the brain was approached. Throughout the whole front lobe, however, on the right side there is marked cell degeneration, focal necrosis and polymorphonuclear infiltration. Stained smears of the purulent material from this abscess showed Gram positive micrococci in pairs and chains, and small Gram negative fusiform bacilli. Subsequent cultures of this material yielded a streptococcus viridans and a fusiform bacillus. The fusiform bacillus was recovered by anaerobic cultural methods. A streptococcus viridans was also recovered from the wound.

Anatomic Diagnosis.—Recent surgical operative wound of the tissues of the right frontal region; absence of a portion of the frontal bone in the region of right frontal sinus; right frontal sinuitis; large abscess of the right frontal lobe of the brain; edema of the tissues of the scalp; sphenoid sinuitis; needle puncture wounds of the dura; marked edema of the lungs; marked hyperemia of the kidneys; fibrous adhesions between the visceral and parietal pleura; missing teeth.

Medical Problems of Aviation.

BERNARD, A., *Progrès méd.*, Paris, 1918—XXIII—166.

The aviator's physician is concerned with many problems other than those of altitude, etc. No physician can tell whether a soldier will make a good aviator, for time and the work alone will tell, but certain moral and physical attributes should be predicated. The best age is between eighteen and thirty. Any hernia should be noted, so that it cannot be used later as an excuse for leaving the service.

Flaccid abdominal walls may lead to syncope during a rapid maneuver. Head injuries contraindicate. Most of the work is done with the arms and hands, therefore injuries of the lower limbs may not incapacitate. Alcohol and excessive smoking cause dyspnea, palpitation and diplopia. Untreated or imperfectly treated syphilitics are barred until after intensive prolonged treatment. Malaria, epilepsy, tuberculosis, bronchitis, pleurisy and asthma are contraindications. Seasickness is not a bar, as it is rarely observed during flight. Albuminuria and glycosuria are absolute bars. The whole respiratory system should be in the most perfect condition, because of the atmospheric rarefaction at great heights. The applicant should be able to hold a full inspiration for forty-five seconds. Exaggerated reflexes, tremors, insomnia and excitability predispose to air neuroses. Sight should be perfect. Glasses are not desired, as they may be lost or broken. Stereoscopic and color vision are important. Night blindness must be looked for in those selected for night flying. Latent hyperopia and strabismus are among the causes of bad landings. Deafness in either ear, suppurative otitis media, perforation of the drum are causes for rejection. Equilibration

and muscle sense should be carefully tested. Psychomotor reactions should be investigated; the average reaction to a visual impulse is 19/100 second; auditory and tactile, 14/100 second; and retardations of 22/100—45/100, 20/100—39/100 and 20/100—39/100, respectively, may be due to fatigue, excesses, sickness or cold; the pilot should not fly until after another examination. The physician should live among the students during training and observe them all the time. In mounting up to 1,500 meters the respiratory cavities become congested; the aviator is relieved by mouth breathing and practicing valsalva. At 4,000 meters the troubles disappear. The same phenomena occur on descending. Most accidents occur in landing and are due to lack of binocular vision, to fatigue, fear or illness.

—Survey of Head Surgery, Surgeon General's Office.

II.—NOSE.

Secondary Infection Following Intranasal Operation.

WOOD, GEORGE B.,

Survey of Head Surgery, Surgeon General's Office,
1918—I—141.

It was noted that during the month of May secondary infections after intranasal operations at Camp Meade occurred with such frequency as to make it advisable to postpone all septal operating except in the more urgent cases.

1. The majority of cases of secondary infection, usually tonsillitis following intranasal operations, such as submucous resection of the nasal septum, were due to the streptococcus hemolyticus. It was noted that this complication was apt to develop when a case of infection from this organism got into the ward where the operative cases were. During the month of June there were eleven submucous resections done without a single case of tonsillitis developing. Early in June an acute mastoid infected with the streptococcus hemolyticus was admitted to the ward, and up to July 18th, seven out of ten submucous resections developed tonsillitis. Since then three cases have been operated on without tonsillitis.

2. Recently cultures have been taken before the operation to determine whether carriers of the streptococcus hemolyticus were more subject to tonsillitis infections, following the above operation, than were the noncarriers. The number of these cultures is too small to justify any conclusion, but the data are submitted to date as a preliminary report:

		Cultures from—		
Operation	Throat	Right Nose	Left Nose	Tonsil- litis
Submucous resection....	Neg.	Neg.	Neg.	None
Submucous resection....	Pos.	Neg.	Neg.	Yes
Submucous resection....	Pos.	Pos.	Pos.	Yes
Submucous resection....	Neg.	Neg.	Neg.	Yes
Submucous resection....	Pos.	Pos.	Neg.	None
Submucous resection....	Pos.	Pos.	Neg.	None
Submucous resection....	Neg.	Neg.	Neg.	None

3. It was thought possible that normal individuals might act as streptococcus carriers and introduce the organism into the operative wards. Memorandum from the Chief of the Laboratory Service, U. S. Army, Camp Meade, Md., concerning this matter is herewith submitted.

4. It is my belief that if acute infectious cases can be kept away from the operative cases, the incidence of tonsillitis following nasal operations will be greatly decreased, if the complication is not entirely avoided. It is realized, however, that this is, at times, practically impossible and that constant vigilance is necessary to prevent the infection getting into the wards.

5. There has been no reason to believe that the technic used in these operations had any influence on the subsequent development of tonsillitis. The attack usually began about the fifth day after the operation.

Report by Capt. George S. Mathers, M. C., Chief of the Laboratory Service, Camp Meade, Md.:

1. To obtain more accurate data upon the incidence of streptococcus carriers among soldiers at Camp Meade, Md., cultures have been made of the throat and tonsillar crypts of 100 normal individuals. In this work, with the assistance of Major Wood, Chief of the Nose and Throat Section, the

tonsils and nasopharynx were carefully examined and the pathologic findings noted. Cultures were made from the external surface of the throat and pharynx. The surface of the tonsils were then painted with tincture of iodine, and material was also planted on blood agar plates. Controls of this technic proved that the results obtained could be relied upon. Of the 100 men cultured in this manner, 30 harbored hemolytic streptococci in their throats; while 36 held positive cultures from their tonsils. In seven instances the throat cultures alone were positive, and in fourteen instances the tonsils alone gave results. When hemolytic streptococci were found in the cultures from the surface of the throat the number of them were usually small. While in the instance of the tonsil cultures the hemolytic streptococci was the predominating organism when present. The common condition, however, was a positive throat and tonsil culture in the same individual; furthermore, in practically all cases in which streptococci were found in throat and tonsils, the tonsils were either moderately or greatly enlarged. These observations suggest that the tonsils play an important rôle in the harboring of hemolytic streptococci in the human body. This seems more probable because cultures made from the tonsils removed at operation yield hemolytic streptococci in almost all instances.

Systemic Manifestations of Chronic Nasal Sinus Infection in Childhood.

BYFIELD, ALBERT H.

J. Am. M. Ass., Chicago, 1918—LXXI—511.

The following are the writer's conclusions:

1. Infection of the accessory nasal sinuses is greater than has hitherto been commonly suspected.
2. The possibility of this infection as a source of general bodily involvement deserves more attention. In a series of cases including chronic digestive disturbances, persistent cough, occult temperature, poor general health, asthma, infectious deforming arthritis and cyclic vomiting, sinusitis has been observed, and a definite relationship between the infection and certain metastatic processes has been established.

3. Symptoms, such as chronic purulent nasal discharge (especially in winter), sneezing, headache, depression and irritability suggest the possibility of an infection of this region, provided that other etiologic factors have been excluded.

4. The diagnosis may be made by the roentgen ray, but exploratory puncture or even curetting may be necessary.

5. The treatment should be conservative and expectant unless the trouble persists and continues to affect unfavorably the health of the patient. In the light of our present knowledge, surgery is then indicated.

Emil Mayer.

Contribution to Nasal War Surgery: Fracture of the Malar Bone, Floor of the Orbit and Ethmoid of the Left Side Caused by a Shell Fragment Passing Through the Maxillary Sinus. Operation Through the Natural Passageway.

BOBONE, T.,

Boll. d. mal. d. orecchio, d. gola, e. d. naso,
Firenze, 1918—XXXVI—25.

September 26, 1917, a soldier, twenty-five years old, entered the ophthalmic hospital at San Remo. Had been wounded June 16th by a shell fragment penetrating 32 millimeters from the external angle of left eye and 20 millimeters below the horizontal portion, passing through this angle. Pus flowed from the wound of entrance, which was of the size of a pea. Below the left eye there was a fistula discharging pus continually. Near the second molar there was another fistula discharging pus. Copious pus discharge from the left nasal cavity. Rhinoscopic examination showed the ethmoid on the left side was transformed into a cavity filled with pus. The zygomatic region and the cheek were swollen and painful. The patient brought with him an X-ray picture which showed three metallic fragments, the largest the size of a lentil, in the neighborhood of the orbit, but the picture was taken from the right to the left, and did not give the exact position.

An external ethmoidectomy after Moure might have been performed, but to avoid any disfigurement the natural route was selected. The head of the middle turbinate was removed, and two days later a spur on the septum was excised, as well as part of the inferior turbinate. At several successive sessions the sequestræ of the ethmoid and granulations were

removed by means of Hajek's hook and Luc's forceps, resulting in good drainage. All the fistulæ disappeared, and a complete cure was obtained. The metallic fragments were not found, but they may have passed off with the pus unobserved.

—Survey of Head Surgery, Surgeon General's Office.

III.—PHARYNX AND MOUTH.

Apothesine and Adrenalin Anesthesia in the Removal of Tonsils.

COLEMAN, JOSEPH.

Med. Rec., New York, 1918—XCIV—413.

Apothesine is the name given to the hydrochlorid of gamma-diethyl-amino-propyl cinnamate. It depends for its anesthetic qualities upon the esterification of an alcohol by an organic acid. The principal groups in its structural formula are the radicles of propyl alcohol and cinnamic acid. Apothesine combined with adrenalin is used.

The patient is given a hypodermic of morphin, grain 1/4, with atropin, grain 1/120, about twenty minutes before the operation. About ten minutes after the hypodermic the anterior pillars of the fauces, the uvula and the posterior pharyngeal wall are brushed with a cotton tipped applicator moistened in 10 per cent cocain solution. This is repeated three or four times until the patient ceases to gag from the application. The anesthetic solution should be freshly prepared by dissolving three tablets in ninety minims of saline solution and bringing the solution to a boil. The first point of injection is at the uppermost part of the anterior pillar, and care must be taken not to insert the needle too deeply, or the fluid will run out. The needle is inserted in such a way that it can be readily seen through the translucent membrane, and in this position about five drops, or enough to form a good sized bleb, are injected. Injection is then continued downward, and each succeeding insertion of the needle is made within the bleb last formed. One of the important points for injection is the lowest part of the anterior pillar, where it joins the base of the tongue. If this region is not thoroughly desensitized, intense pain will be caused by cutting through with the snare wire. The anterior pillar being thoroughly injected, we now carry

out the same procedure in the posterior pillar, except with the latter being shorter and more difficult to inject, two injections will suffice. Both sides are injected before the operation is begun. It is unnecessary to inject into the tonsils. In all cases desensitized in this manner inquiry was made at each step of the operation to find if the patient had any pain, and invariably the reply was that nothing could be felt. Enucleation can begin as soon as the injection is complete, because anesthesia is immediate, and there is no occasion for waiting as when cocain is used. The technic of operation does not differ from that used by other operators with cocain anesthesia. In children, for obvious reasons, the use of general anesthesia is advised. It was remarkable how little these cases bled, both during and after operation, and how little postoperative shock any suffered. The amount of inflammatory reaction was slight and healing rapid. Anesthesia seemed to last about one and a half to two hours. These operations were all done in a sitting posture. Since there is no danger of toxicity, it is well to distend the pillars with the apothesine-adrenalin solution. In ten cases the entire quantity made up (ninety minims) was injected. Six were women. The youngest was a girl of sixteen.

Summary.—1. The apothesine solution can be freshly prepared and easily sterilized without deterioration.

2. It does not produce sloughing, although considerable tension is made in the tissues.

3. The solution may be used in any reasonable quantity, no toxic effect being observed after the use of five ounces.

4. With proper care in the technic of infiltration the operation can be performed without the slightest pain.

5. Reaction is slight, and most patients are able to take food in a day or two.

Emil Mayer.

Report of a Case of Primary Tuberculosis of Faucial Tonsils.

OERTEL, T. E., AND GRIOT, GEORGE A.

J. Am. M. Ass., Chicago, 1918—LXXI—968.

Male, aged twenty-six years, in December, 1917, had an attack of tonsillitis of a type unknown to him, lasting about two weeks. He had not recovered completely from this attack,

as a soreness had persisted in both tonsils, more pronounced in the left, until the time of consultation, March 7, 1918. Also he had noticed a swollen condition of the left tonsil, which had persisted since the attack of tonsillitis in December, 1917. Four weeks previous to consultation he had complained of hoarseness which would last for a few days, then subside for a day or two, and again recur. For the previous two weeks hoarseness had been constant, growing progressively worse. Eating sour fruits, such as lemons or grapefruit, caused irritation of the throat, but did not cause coughing.

The epiglottis was very much enlarged, about half an inch in thickness, and presented a large eroded area on the left side. It was anemic and covered with granular masses, the size of small birdshot, yellowish and semitranslucent. A mucopurulent secretion was noted, covering both the epiglottis and the structures of the larynx. The arytenoid cartilages were very much enlarged. The left was much larger than the right, having a distended appearance, as though it were filled with air. The left vocal cord was swollen, with a large ulcerated area near the middle and much elevation along the edge. The right cord was not much thickened and presented a small, ulcerated area where it approximated the ulcer of the left cord. The trachea presented a thickening of the rings immediately below the left vocal cord. In the right lung fine râles were audible in the supracapsular space after cough. In this region, over an area the size of a dollar, vocal and tactile fremitus was slightly increased. The left lung was negative.

The right tonsil was the size of a small hickorynut; the posterior third presented an ulcerous excavation, bandlike in form, with the surface roughened and studded with numerous little yellowish elevated nodules, the size of a mustard seed shot, and extending from the upper to the lower pole, taking in the posterior third from the apex of the pillars to the base of the tonsils. This ulcerative process had eroded the parenchyma almost to the capsule. A small remnant of the parenchyma remained on the posterior pillar. The pillars showed no departure from the normal.

The left tonsil presented an ulcerated area, triangular in form, covering the anterior two-thirds of the tonsil below, and leaving a small portion of tonsillar tissue posteriorly un-

affected. The depth of the ulcer and its appearance were similar to those already described in the right tonsil, with this difference, that considerably more tonsil tissue was destroyed. Perhaps this would indicate that the infection had existed primarily in the left tonsil. The cervical glands were palpable on both sides and slightly enlarged. The submaxillary, axillary and inguinal glands were negative. The temperature ranged from normal to 99.2 degrees F.

Both tonsils were removed March 9, 1918, under general anesthetic by dissection and snare. There was very little hemorrhage, and the fossæ presented a smooth appearance.

The capsule showed an uneven surface. The inner surface of the tonsil appeared uneven and granular, and of a mottled dark red, with points one millimeter in size and almost white. The mucous membrane was apparently entirely eroded. The left tonsil resembled the right, but was not quite so thick. In the microscopic examination, tubercle bacilli were found in mucus recovered from the larynx.

The patient was sent to a tuberculosis sanatorium March 28, 1918.

(The history as here presented does not seem to warrant the title of this paper.—E. M.)

Emil Mayer.

Systemic Manifestations of Disease in the Throat.

PFINGST, ADOLPH O.

Am. J. Surg., New York—1918.

One of the most valuable signs indicative of tonsillar infection is glandular enlargement in the neck, more especially the gland lying in the angle between the facial and internal jugular veins below the angle of the lower jaw. As this gland forms the first relay of the lymphatic vessels emanating in the tonsil fossa, it readily becomes enlarged and oftentimes tender to the touch during tonsillar infection, and hence furnishes a valuable aid in identifying the tonsils as a source of systemic infection.

Whenever the tonsils can readily be recognized as the foci of infection, in cases of systemic disease, their removal is imperative and should be urged; but not before other structures in the body which are frequently the sites of focal infec-

tion are eliminated. In the absence of sinus disease, with no alveolar abscess, or pyorrhea alveolaris, and with reasonable assurance that the alimentary and genitourinary tracts are not at fault, it would seem that tonsils and adenoids should be removed in cases of systemic involvement, even in the absence of any history of tonsillar disease, and in the absence of any apparent trouble in these structures.

Emil Mayer.

A Study of Diphtheria Carriers in a Military Camp.

KEEFER, FRANK R., FRIEDBERG, STANTON A., AND

ARONSON, JOSEPH D.

J. Am. M. Ass., Chicago, 1918—LXXI—1206.

The writers present the following conclusions:

1. A single negative culture is only of relative value, as is shown by the fact that preoperative cultures, taken from tonsils that later proved positive for diphtheria, were negative in 22.8 per cent of the cases.

2. The importance of nasal cultures is shown by the fact that in routine cultures taken from carriers, 26 per cent were positive from the nose.

3. Cultures from chronic carriers should be tested for virulence.

4. The carrier state is maintained by some underlying pathologic condition of the affected tissues.

5. In the great majority of cases the carriers harbor the bacilli in the tonsils; a few carry the germs in the nose only; a small group maintains the infection in both nose and tonsils.

6. Conclusions based on the results of local treatment should be founded on careful and prolonged bacteriologic study. Cultures should be taken immediately before treatment, or, if local treatment is being administered, this should be suspended for a number of days before cultures are taken. The results of local treatment are problematical, since the organisms are situated deeply in the tissues.

7. In persistent carriers in whom the focus of infection is the tonsil, enucleation offers the only certain procedure for terminating the carrier state.

8. The most persistent nasal carriers are those in whom chronic inflammatory or atrophic processes are found. It is

impossible, in view of the varying culture returns, to state when the condition has finally cleared.

9. Centralization of authority is necessary for the control of an epidemic of diphtheria and diphtheria carriers in camp. Release of patients from quarantine should be under the supervision of the laboratory.

10. During an epidemic, patients should not be admitted to a clean ward unless they have had at least two successive negative cultures from the nose and throat.

11. Improperly constructed and improperly worn masks give a sense of false security.

12. The hospital personnel should be given a Schick test, and those giving a positive reaction should be immunized with toxin antitoxin mixture.

13. Toxin for the Schick test should be prepared fresh, and no diluted toxin should be used after twenty-four hours. The undiluted toxin should be kept in the dark and in a refrigerator.

14. Intermittent chronic carriers should be employed as attendants in diphtheria wards or in quarantine camps. They should be separated from the hospital personnel and from their organizations.

15. Diphtheria patients may be discharged from the hospital after they have had at least three negative cultures at three-day intervals. Chronic carriers should not be discharged until cultures taken over a long period of time prove consistently negative.

Emil Mayer.

Mumps and Myocarditis.

PUJOL, M.

Arch. de méd. et de phar. mil., Paris, 1918—LXIX—4.

The writer has encountered nine cases of myocarditis among 450 men with mumps, but some other cause seemed to have cooperated in six cases. In three cases, however, the mumps seemed to be alone responsible for the myocarditis. The three men recovered, but were unable to resume active service and were given sedentary positions. In two of the cases the heart symptoms attracted attention at the height of the parotitis. One man complained of dull retrosternal pain and a few painful extrasystoles. In all, the heart action was extremely weak.

This was not noticed in repose, but the reserve force was very small, and gave out at any slight exertion, with dyspnea, precordial pain and pounding in the chest when the man tried to climb stairs, carry his bed roll or march. The physical signs are minimal, merely a variable degree of tachycardia, but functional tests readily reveal the depreciation of the organ. It is futile to attempt to return such men to active service; they merely return to the hospitals again after a change of sectors or an affaire. Only the milder cases can be returned to their posts with request that they be spared all but light duty. On the other hand, complete dismissal from the army is only exceptionally called for.

Emil Mayer.

**Perforating Ulcer of the Hard Palate Resembling Tertiary Syphilis
but Due to a Fusospirillary Invasion (So-called
Vincent's Angina.)**

BARKER, LEWELLYS F., AND MILLER, SIDNEY R.

J. Am. M. Ass., Chicago, 1918—LXXI—793.

A man, aged forty-seven years, consulted one of us because of an ulcer, which had made its appearance on the roof of his mouth. His previous history was in all respects negative. One day he noticed a little soreness on the roof of his mouth, and a small white spot, to which he paid no particular attention, until within a few days an ulcer developed, gradually becoming larger and more painful. Despite his negative history, a syphilitic condition was suggested by several physicians.

Physical examination revealed slight anisocoria, rather marked oral sepsis and gingivitis, especially around the posterior molars, an unpleasant, fetid odor to the breath, and a well defined, punched out ulcer, about the size of a dime, situated on the hard palate, covered with a thick, creamy, easily removed exudate, and surrounded by a deep red, somewhat indurated areola. The base of the ulcer bled easily. The clinical picture certainly justified the suspicion of syphilis, a view concurred in by a nose and throat specialist. The patient was afebrile and not sick.

Laboratory studies revealed a normal blood picture, and the Wassermann reaction was negative with each of three different sets of reagents. Smears made from the exudate showed

enormous numbers of bacilli fusiformis, and many coarse, readily stained spirochetes, presenting from five to eight wide undulations. A diagnosis of so-called Vincent's angina was made, and the lesion promptly healed in a few days under treatment with dichloramin-T and local applications of concentrated arsphenamin solutions. There has been no recurrence.

Though infrequently mistaken for other conditions, the diagnosis of Vincent's disease, and particularly of Vincent's angina, is relatively easy and should present no difficulties. The essential points always to be borne in mind are:

1. The usual disproportion between the constitutional symptoms and the appearance of the lesions. "The patient should be sicker than he is."
2. The clinical history.
3. The negative laboratory findings with the one exception of smears made from the ulcerative lesion.

Evidence has accumulated in the last few years to show that ulcerative lesions of the mouth and throat of a nonsyphilitic nature are extraordinarily common among the Allied troops. These conditions are the cause of much unnecessary and expensive invalidism; they are probably wholly preventable and hence not to be tolerated. Military and civil practitioners should constantly bear in mind the following well established points:

1. Vincent's disease is in all likelihood a primary peridental gingivitis, occurring frequently in certain particular areas, liable to develop anywhere in ill kept mouths, associated with characteristic gum lesions, and capable of spreading to any part of the buccal cavity or throat. The disease is both infectious and contagious.
2. The lesions most often seen clinically are ulcerations of the tonsils, to which the name "Vincent's angina" should be restricted.
3. No matter where located, the lesions of Vincent's disease are caused by the activities of the bacilli fusiformis and an associated spirochete. Their specificity is as yet unsettled. It is quite likely that they normally are symbiotic saprophytes, capable under certain conditions of causing pathologic changes.
4. The diagnosis of Vincent's disease from diphtheria and syphilis is simple. Smears from the lesions usually suffice.

5. Cases of uncomplicated Vincent's disease invariably give a negative Wassermann reaction.

6. The local application of concentrated solutions of arsphenamin is regarded as the best form of therapy. Most cases clear up within a few days.

7. Prophylaxis is better than cure. (Oral sepsis is inexcusable.

Emil Mayer.

Cancer of the Oral Cavity, Jaws and Throat; Treatment by Electrothermic Methods or in Combination With Surgery, the Roentgen Ray and Radium, With an Analysis of Two Hundred Cases So Treated.

CLARK, WILLIAM L.

J. Am. M. Ass., Chicago, 1918—LXXI—1365.

The methods considered are electrodesiccation and electrocoagulation. The dessication method is one by means of which malignant growths of small or moderate size may be destroyed by the utilization of heat of just sufficient intensity to desiccate or dehydrate the tissues, and is produced by a monopolar high frequency current of the Oudin type, which is applied to the lesion by means of a steel needle or other pointed metallic applicator (usually steel knitting needles) which may be cut and curved, if necessary, to suit the case under treatment. The desiccation method is of advantage when the lesion is localized, and a good cosmetic result is to be desired, and is subject to such control as to area and depth that a very small growth, even on the cornea, may be successfully treated without injury to vision, as may a growth on the vocal cords be destroyed without impairing phonation. The very slight trauma and absence of secondary inflammation probably explains the absence of scarring and the success obtained in treating delicate structures.

Electrocoagulation is produced by a bipolar high frequency current of the d'Arsonval type, is more penetrating and intense in action than the desiccation method, and is utilized to destroy large growths, including those that involve bone.

When the antrum or other structures not easily accessible are involved, or when normal tissues cover the growths, operative surgery should be practiced as a preliminary to expose

the lesion or to extirpate the gross mass of malignant tissue, followed immediately by the electrothermic treatment to check hemorrhage and to reach malignant tissue not possible to reach by the scalpel or bone cutting instruments.

When involved cervical glands are to be removed, excision must be practiced, because it would be dangerous to work with the current near vital structures in the neck.

Two hundred cases were treated by one or both of the electrothermic methods or in combination with surgery, the roentgen ray and radium.

When the lesions recur only locally, there is a chance of success if the patient is treated a second or, indeed, a number of times; but if there is a recurrence in the glands of the neck, further treatment is usually of no avail.

The basal cell, or rodent ulcer type of epitheliomas occurring on cutaneous surfaces, even though advanced and with bone involvement, is so satisfactorily treated by the desiccation and coagulation methods that these lesions practically all recover when treated thoroughly.

The chances of success in cancer of the oral cavity vary with localization, the anatomic location and the presense or absence of glandular involvement.

The analysis of results obtained in 200 cases, and the illustrations, serve to give an idea of the rôle the desiccation and electrothermic coagulation methods can be expected to play in the treatment of cancer of the oral cavity, jaws and throat, and in which types of cases the use of operative surgery, the roentgen ray and radium in combination is justifiable.

Emil Mayer.

The Use of Heat and Radium in the Treatment of Cancer of the Jaws and Cheeks.

New, G. B.

J. Am. M. Ass., Chicago, 1918—LXXI—1360.

After the patient is anesthetized with ether, a mouth gag is inserted opposite the affected side. The tongue is drawn to one side out of the way, by the aid of a stomach clicker. The water cooled speculum is inserted, and all the teeth in the area involved or those that prevent good exposure of the growth are

removed. If it is possible, the entire growth is excised from the jaw or cheek, with a knife cautery, and the base is cauterized with soldering irons. If this is not possible, the irons are inserted into the tumor. The water cooled speculum prevents the burning of the lips or cheeks, except in the area being treated, and it affords good exposure. A wooden tongue depressor holds the tongue out of the way and prevents it from being burned. The cautery should be used longer than seems really necessary; at least for from twenty to forty-five minutes. If the growth is in the upper jaw and involves the antrum, the soldering irons are carried up into the antrum and the entire growth is gradually burned away.

Soldering irons are found to be the most satisfactory type of cautery, as the heating element in the handle of the electric cautery usually interferes with a good view of the area that is being treated. If the irons are too hot, the surface cauterized becomes carbonized and prevents the penetration of the heat. A slow heat that gradually cooks the tumor is preferable.

About two weeks after the cauterization, most of the slough will have cleared off, and radium may be applied directly into this open area. It is directed into the ulcerating area on lead applicators, using a 50 or 100 milligram tube within a silver tube, for from fifteen to twenty hours, without screening. If the growth has involved the antrum, the radium is placed in the antrum, packed there with petrolatum gauze, and left in place for the period of hours required by the particular type of lesion.

Of the twenty-one patients treated, twenty were traced; of these, fourteen have been free of local recurrence for from six to eighteen months. One patient recauterized three months previously, thus far has no recurrence. One died of lymphatic leukemia six months after operation; there was no recurrence. Two of the fourteen patients (one with epithelioma of the cheek and one with epithelioma of the upper jaw and cheek) have developed glands of the neck and have had block dissections. Thus twelve of the twenty patients have had no recurrence locally or in the glands for from six to eighteen months. One patient has a hopeless local recurrence. This patient was operated on before coming to the clinic. Two patients died of the cancer; one of these had been operated on before com-

ing to the clinic; one consulted a plaster doctor, and his present condition cannot be learned from his letter. There was no operative mortality.

The group of cases shows that the immediate results in the treatment of epithelioma of the jaws and cheeks without glandular involvement, by the use of the cautery and radium, have been very encouraging. The end results cannot be foreseen, but we believe that by the addition of radium to the treatment much more is being accomplished than formerly.

An Experimental Study of Parotitis.

WOLLSTEIN, MARTHA.

J. Am. M. Ass., Chicago, 1918—LXXI—639.

Three years ago material was obtained in the following way from a number of children acutely ill with parotitis: The patients were allowed to rinse the mouth with sterile physiologic sodium chlorid solution, and the washings were filtered through a new Berkefeld candle N. The resulting filtrates were proved sterile by aerobic and anaerobic culture methods and were injected into the parotid glands and testes of healthy, half grown cats. During the past winter the prevalence of parotitis in army camps near New York City provided the opportunity for repeating the work with material from adult (soldier) patients.

Results suggesting that protective substances may be developed by the cats after they have passed through a typical attack of experimental parotitis were obtained in two ways: 1. Animals were reinoculated from one to four months after the first inoculation and failed to develop the typical symptoms they had previously exhibited. 2. As was to be expected from the results of these reinoculation experiments, the serum from recovered cats had the power to reduce the development of the reaction caused by the injection of the virus of parotitis when left in contact with it at 37 C. for two hours. Animals inoculated with such a serum virus mixture failed to develop the typical symptoms or lesions produced by the virus alone or by virus treated with normal cat serum.

An interesting recurrent case occurred in a soldier. His first attack of mumps began in November, 1917, and he had three recurrences, the last one early in May, 1918. March

13th and again, May 1st, his filtered saliva was injected into a cat, with positive results. During the second recurrence, May 15th, the mouth secretions were found to be negative and the facial swelling of the parotid had disappeared. Jochmann says that the swelling of the parotid may remain for months or even a year. The lesion in this soldier lasted for a period of five and a half months, and his saliva was infectious for that period.

The writer summarizes: Cats injected into the parotid gland and testicle with a bacterial sterile filtrate of the salivary secretion of children and adults in the active stage of parotitis or mumps develop a pathologic condition resembling the condition present in mumps in human beings.

After an incubation stage of from five to eight days definite changes have been noted in the temperature, blood leucocytes and inoculated organs.

The rise of temperature and the leucocytosis precede the glandular swelling, but all the changes reach the maximum at about the same time, after which they decline, and normal conditions are reestablished in about four weeks.

The intraparotid and intratesticular injections of extracts of normal parotid gland and testicles may cause a mild rise of temperature and leucocytosis of brief duration, but swelling and tenderness are absent. The white cells increased are the polymorphonuclears and not the lymphocytes. The injection of filtrates of normal saliva causes only a mild and brief rise of temperature, but no leucocytosis or swelling of the glands.

The saliva of man and of inoculated cats, as well as the inoculated glands of the latter animals, were found to contain the filterable infective agent.

The virus of parotitis is most readily detected in the saliva during the first three days of the disease, less readily on the sixth day, and not at all after the ninth day. This would have a practical bearing on the question of infectivity and length of isolation period for mumps patients.

The virus was also detected in the blood of patients showing marked constitutional symptoms.

The serum of recovered cats was found to contain an immune body which diminished or even neutralized the action of the virus of parotitis.

Emil Mayer.

Simple Method for the Cure of Peritonsillar Abscess.

BILANCIONI, G.,

Policlin., Roma, 1918—XXV—413.

Peritonsillar abscesses are rather frequent among soldiers. Three or four attacks in a year are not uncommon. Considering the frequency of recurrence the author undertook to determine if the usual methods of operation were not responsible for the inadequate cure. The three methods in use at present are those of Lemaitre, Ruault and Killian.

The anatomic relations are of great importance. If we examined the anterior palatine arch (glossopalatine) we find a fold of mucous membrane which arises from its free margin and extends backward, passing in front of the tonsil which it partly covers. This fold, which is of great pathologic importance, has a triangular form (*plica triangularis* of His) and at its apex unites with the palatine arch. Its base disappears in the base of the tongue, while the free margin adheres closely to the body of the tonsil or extends for a variable distance above it, leaving the *interstitium interarcuarium* of His. Thus the tonsil is to a great extent surrounded by two folds which come from the anterior pillar, the *plica triangularis* in front and the *plica falciformis* above. At the upper portion of the tonsillar region, immediately behind the triangular fold, a curved probe may be inserted into a cavity which extends into the soft palate and which has important relations to the tonsil. In this space, the *supratonsillar fossa* of His, the pus from suppurating tonsils gathers. Some writers hold that in this inflammation the tonsil plays the primary, according to others the secondary rôle. His, Paterson and others believe that peritonsillar abscesses originate in the *supratonsillar fossa* and in the palatine recess, but it is quite evident that primary phlegmonous tonsillitis is much more common than is generally assumed, but usually gives rise to only inconspicuous abscess or to moderate inflammation which changes to acute follicular or parenchymatous tonsillitis. Generally these benign cases escape the specialist and fall rather in the field of the general practitioner, since the symptoms are confined to enlargement of the tonsils, with scant exudation adhering and protruding from the crypts.

edema of the pillars and uvula, and dysphagia and sialorrhea with symptoms lasting four to five days. Suddenly some yellow fetid pus makes its way from the tonsil at some point difficult to notice and the patient feels relieved, and the tonsil is a little less voluminous. When the subjective disturbances are exaggerated, so that the patient can swallow neither solids nor liquids, suffers intense pain and almost suffocates, the fever being high, the neck rigid, there will be observed, if the mouth is opened and the tongue depressed, an enormous swelling in the region of the soft palate, located above the enlarged tonsil and projecting inward and downward. The uvula is intensely edematous and prolapsed. This condition lasts ten to twelve days if not operated upon. This form of angina, which is much more serious than the former, is nothing but an acute follicular tonsillitis which, instead of being localized at various points of the tonsillar body which may open outwardly destroying or perforating the parenchyma, is situated at the upper pole of the tonsil, which is usually well developed, with large crypts, true germ nests, which penetrate deep, at times more than one centimeter, into the interior of the supratonsillar fossa. If a sound is introduced between the uppermost part of the tonsil and the pillars, it will be found that the aperture through which the interior of the fossa is penetrated is often constricted by bands which favor the retention of tonsillar secretions in the cavity of the fossa. Not rarely the anterior and posterior margins adhere strongly to the respective pillars. The existence of these bands explains why the pus gathers all around the tonsil causing great suffering. The knowledge of these anatomic conditions also explains how an incision from the front, through the soft palate, is often insufficient, failing to reach or only partly emptying the sack behind the tonsil.

To give exit in this form of abscess and, above all, to prevent the relapses due to remains of cryptic tonsillar tissue in the fossa and imbedded in cicatrices, and which within a short time would give rise to a new abscess, the author proposes as a radical cure the extirpation of at least the upper half of the tonsil. Incising the body of the tonsil, the abscess is opened and emptied in toto so rapidly that in half an hour the patient is free from his sufferings. The lower portion

of the tonsil may be left in place without harm. There is, in fact, no subtonsillar fossa, as the tonsil at its lower pole is delicate and almost always attached to the neighboring tissues without projecting between the bases of the pillars and the base of the tongue, as is the case at the opposite pole.

—Survey of Head Surgery, Surgeon General's Office.

On Bone Grafting in Gunshot Injuries of the Mandible.

PLATT, H., CAMPION, G. G., AND RODWAY,

Lancet, London, 1918—CXCIV—461.

During the past two years more than five hundred cases of injuries of the lower jaw have been under treatment in the Second Western General Hospital. The operation of bone grafting has been performed on nine occasions, and has been advised but refused by the patient in at least an equal number of cases.

The writers found that two distinct types of fracture exist in which the autogenous bone graft can be used: (a) Where there has been a considerable loss of bony tissue with a resulting gap, and (b) where with comparatively close apposition of the fragments an unstable fibrous union has developed in spite of long continued fixation by splints. In the first class of case the bone graft fulfills the obvious mechanical function of restoring continuity; in the second class, where the osteogenetic capacity of the mandible in the immediate vicinity of the fracture has entirely disappeared, refreshing the bone ends is an absolute necessity if bony union is desired. In the course of any refreshing operation a small gap is inevitably produced, and this can be conveniently bridged by a graft which, in addition to its mechanical function, affords a potent stimulus to osteogenesis in the bed in which it is placed.

At the present time there are wide differences of opinion as to the source from which a bone graft should be taken. The authors then report in detail cases in which they have done bone transplantation. They have employed the rib, scapular and tibial grafts, and discuss the advantages and disadvantages in the use of these.

The tibial graft, removed with the twin saw, is the most accessible of all, and its use is sometimes agreed to by patients who object to the removal of a piece of rib.

With regard to the methods of fixation of a graft, the writers are confident that the avoidance of all foreign materials is an advantage. The bone flap method gives perfect fixation, and the careful suturing of the deeper parts of the wound in layers contributes an additional support.

Where it has been possible, the immobility has been maintained by splintage for some time after the operation in order to avoid strain on the graft.

Conclusions.—From such a small series of cases at the present stage no generalizations can be enunciated. The functional results in these cases have been such as to warrant the future employment of the operation of bone grafting in suitable cases. The exact technic can only be standardized after a study of the remote results in a larger series of operations. The double function of the graft, mechanical and physiologic, is well demonstrated in the series of radiograms accompanying the article. This series of bone graft operations is presented as a personal experience, without any comment on the contemporary literature, which is already voluminous.

—Survey of Head Surgery, Surgeon General's Office.

**Hemorrhage From an Aneurism of the Internal Carotid Artery,
Following Septic Sore Throat.**

RANSOHOFF, JOSEPH.

Ann. Surg., Phila., 1918—LXVIII—152.

Two cases are reported. Case 1 appeared in a boy of seventeen years who had had a peritonsillar septic inflammation of the throat which invaded the retropharyngeal lymphatics and caused an abscess. The temperature rose to 105° , with corresponding rapidity of pulse rate, and the abscess opened spontaneously, but the opening was later dilated with forceps. Although the condition progressed favorably, hemorrhage from the common carotid artery suddenly came on without warning and proved fatal in a very few minutes.

Case 2 was that of a girl sixteen years old who, previous to admission to the hospital suffered from a septic sore throat, with a white count of 14,000 to 20,000, attended with 75 per cent polymorphonuclears, 7 per cent small lymphocytes and 12 per cent large lymphocytes and 6 per cent mononuclears. Besides the condition within the throat there was a great deal

of swelling in the glands of the submaxillary triangle of the left side, which because of a matted condition indicated an extensive periadenitis. There was noticed at this time a very decided narrowing of the left palpebral fissure and of the left pupil, the very characteristic signs of pressure on the cervical sympathetic cord.

The abscess had been opened eight days before admission into the hospital, and temperature had subsided somewhat, but it continued irregular between 100 and 104 degrees, while the pulse rate varied from 122 to 130. Three days before admission there was a slight hemorrhage from the drainage opening in the pharynx, but this subsided spontaneously. This occurred with great severity on the day of admission. On examination it was found that the hemorrhage was due to an aneurism of the internal carotid artery. The examining finger detected in the posterolateral wall of the pharynx a swelling as large as a peach, elastic, distinctly pulsating and easily recognizable as an aneurism from which recurrent hemorrhage had come. The common carotid was tied at the point of election, but before the artery was ligated it was compressed for four or five minutes, the patient being permitted to come from under the influence of the anesthetic so as to determine, as far as possible, whether coma or paralysis would result from the ligation. Considerable dyspnea resulted from a hematoma in the larynx as a result of the operation and a tracheotomy was required. The patient made an uninterrupted recovery.

—Survey of Head Surgery, Surgeon General's Office.

Nasopharyngeal Conditions in Meningococcus Carriers.

CLEMINSON, F. J.

Brit. Med. J., 1918—II—51.

Application of antiseptic sprays to the nasal cavities has been the treatment mainly used to clear up carrier cases infected with the meningococcus of cerebrospinal meningitis. Wide variation in resistance to such treatment suggested that certain anatomic or pathologic factors must be the cause of this resistance. Cleminson's study is based on forty-seven cases. (1) *Pyorrhea alveolaris*. For normals the average index is 0.8. For carriers in general it is the same. But

in a group of carriers requiring prolonged treatment the index was 1.1. (2) Adenoids. Normals show 1.1, and all carriers 1.7. (3) Firm mucous contact. By this term Cleminson designates those conditions in which a thickened or deviated septum is in firm contact with one or both middle turbinates. Normals have an index of 1.5; all carriers 2.5, and those requiring prolonged treatment, 3.1. (4) Translucency of the maxillary antrum. Normals 1.5 of lessened translucency; carriers, 1.2. (5) Tonsils. Similar indices for normals and carriers.

Conclusions.—Factors favoring the genesis of carriers: (a) Adenoids; (b) the conditions implied in the term "firm mucous contact." Factors unfavorable to the genesis of carriers: Already existing septic infection of the sinuses. Factors favoring resistance to treatment: (a) Pyorrhea alveolaris; (b) firm mucous contact; (c) already existing septic infection of the sinuses.

—Survey of Head Surgery, Surgeon General's Office.

Simulation of Mumps.

TREMOLLIÈRES, F., AND CAUSSADE, L.

Presse méd., Paris, 1918—334.

This is accomplished by forcibly puffing out the cheek, closing the nostrils with the finger and striking the mouth with the hand. This forces air into the parotid region, which enlarges and resembles mumps.

—Survey of Head Surgery, Surgeon General's Office.

Report on Six Cases of Tonsillectomy in Diphtheria Carriers.

BALLANTYNE, C. C., AND CORNELL, B. S.

Brit. M. J., 1917—686.

Tonsillectomy by the snare method was done in six diphtheria carriers. Subsequent bacteriologic examination showed that the diphtheria bacilli had disappeared, usually with the healing of the wound.

Previously, living cultures of staphylococcus pyogenes albus had been sprayed over the tonsils, in the hope of outgrowing the diphtheria bacillus. Temporarily cultures showed only staphylococci, but within a day or two the diphtheria bacilli reappeared.

—Survey of Head Surgery, Surgeon General's Office.

Treatment of Wounds Involving the Mucous Membrane of the
Mouth and Nose.

COLE, PERCIVAL P.

Lancet, London, 1918—CXCIV—11.

As a preliminary, the author restates his views, voiced previously on several occasions, as to the dental and surgical treatment of injuries involving the mouth and jaws, namely, that the principles and plan of treatment should be from the very first evolved by the combined efforts and pooled knowledge of the surgeon and dental surgeon concerned. Treatment of these injuries should be viewed as a whole, administration being undertaken by this individual or that, according to the lines along which the technical ability of the one or the other has been developed.

In the majority of cases a wound of the cheek involving the mucous membrane is complicated by fracture, more or less extensive, of the lower or upper jaw. The functional and cosmetic effect must both be considered, but it will be generally conceded that functional should precede merely cosmetic considerations. From the viewpoint of function the bony lesion is of more importance than the injury to the soft tissues, and its efficient treatment should consequently hold first place. Any method of treatment which ignores this cardinal fact cannot commend itself to our judgment. It is the writer's contention that the primary suture of these wounds cannot be considered a satisfactory procedure. Were the fracture dealt with adequately and simultaneously, all would be well. But it is not. To be of any service, primary suture apparently must be done early, more early than will allow of the preparation of an effective splint. If primary suture rendered the adaptation of a splint more easy, all would be well. But it does not. So far from this being the case, the insertion of any form of splint has, in some instances, been impossible without resort to surgical measures. The conviction has been forced upon the writer that primary suture of such wounds should never be undertaken when complicated by an associated fracture unless the fracture can be dealt with at the same time.

The method of primary suture being thus rejected, it is bet-

ter to wait until all sepsis has disappeared and the wound is soundly healed before undertaking the necessary operative measures. In the case of a cicatrizing wound threatening the movements of any particular joint, it is the surgeon's endeavor to maintain the joint in that position which will most effectually conserve the movement whose limitation is threatened. The movement, which will assuredly be either considerably limited or rendered totally impossible by cicatricial contraction occurring in a wound of the nature herein discussed, will be that of opening the mouth. It is logical as well as incumbent on the surgeon, and dental surgeon, to prevent such limitation by maintaining the jaws in a position of open bite. The necessary plastic operation was thereby reduced to a mere readjustment of the existing tissues. The surest way of maintaining the buccal sulcus is never to lose it. A policy of prevention as regards this important point would go far to render obsolete the many ingenious devices that have been evolved to deal with it.

Preliminary treatment completed, the patient is ready for operation. The type of operation best suited to this class of case is a matter in which individual opinions will no doubt differ. The writer suggests three basic considerations which determine behavior in this region: 1. The progressive tendency of an epithelialized flap to shrink. 2. For practical purposes the cheek may be regarded as consisting of two layers—an outer skin layer and an inner mucous membrane layer. The elasticity and distensibility of the cheek are dependent on the laxity and suppleness of both. Tension in one will vitiate function, however lax may be the other. Functional incapacity will be in direct ratio to the tension present in either layer. 3. The fundamental difference between real and potential loss of tissue. The real loss can best be estimated by a careful study of the wound immediately or soon after its infliction. As the wound heals, the additional factor of scar formation is introduced. The effect of radiating lines of scar tissue will be to limit the elasticity and flexibility of the surrounding tissues, and so render it impossible to obtain a satisfactory result by adopting the surgical measures applicable in the case of a freshly made, clean cut gap of equal extent. This cicatricial factor it is which more often than not renders

direct borrowing impracticable and makes necessary the introduction of new tissue.

The measure of new tissue necessary constitutes the potential or operative loss.

A consideration of these factors leads to the conclusion that the introduction of fresh tissue is frequently called for, and that the use of doubly epithelialized flaps is indicated. Skin flaps may be epithelialized on the mouth aspect by mucous membrane flaps. The author feels that it is futile to attempt to do what is usually known as "bringing the parts together" in the repair of these facial wounds. He describes in detail several of his cases in which plastic operation was performed, taking the grafts from the neck. The report shows the result in the treatment of two cases with lateral nasal deformities. The mucous membrane was replaced by a hinged skin flap from the cheek.

SUMMARY.

1. The result in any given case is largely determined by the initial treatment adopted.

2. The whole plan of treatment should be the joint evolution of surgeon and dentist working in concert to attain a common aim.

3. Open bite splints should invariably be used in the type of case considered.

4. The method known as bringing the parts together should frankly be recognized as unsatisfactory and be abandoned.

5. Skin is an admirable substitute for mucous membrane in that its texture is suitable and its extent unlimited.

6. Radiations may render the plastic surgeon such valuable assistance that facilitates for treatment by this method should be provided in the case of any jaw center or hospital.

—Survey of Head Surgery, Surgeon General's Office.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Gunshot Wound of the Larynx, Phlegmon, Recurrent Paralysis.

COULET, G.

Rev. hebdomadaire de laryngologie, etc., Paris, 1917—XXXVIII—322.

A soldier, aged thirty years, was wounded by a bullet which entered near the anterior border of the right trapezius and emerged on the left side of the neck at the anterior border of

the sternocleidomastoid, on a level with the thyroid cartilage. On admission to the hospital, a day or so later, the patient had dysphagia, dyspnea, aphonia and sialorrhea. Pulse rapid, temperature 40° C. Marked swelling of the neck was present, and the larynx was displaced to the left. In some places there was gaseous crepitation. Every exploratory maneuver caused much pain. Laryngoscopic examination showed a large red tumefaction, evidently an abscess, occupying all the left half of the endolarynx, reaching from the epiglottis to the pyriform sinus. The right half was perfectly healthy and mobile. Treatment consisted of hot compresses and inhalations. The following day his temperature was gone, and his general condition was better. Laryngoscopy showed a diminution of the swelling, and pus was noted discharging into the pyriform sinus. Improvement continued and when the patient left the hospital all edema had disappeared, but recurrent paralysis was still present.

A. Miller.

Report of a Case of Foreign Body in Left Main Bronchus for Ten Years.

HUBBARD, THOMAS.

J. Am. M. Ass., Chicago, 1918—LXXI—1380.

Tracheotomy was indicated in this case to make easier the evacuation of the mucopus in the lung whereby the field was cleared and the foreign body properly grasped, and also as a protection to the operator. There was danger of losing the foreign body, or part of it, at the laryngeal isthmus, in which case it would probably have dropped back into the sound lung.

Perfect facilities for aspiration made ether narcosis safe, and in consideration of probable complications in extraction, such as necessity for turning, or a fibrous stricture of the bronchus, absence of tumultuous coughing was a factor in safety.

Without tracheotomy and direct aspiration of the accumulation of mucopus, general anesthesia would not have been safe, and by preliminary tracheotomy and repeated aspirations the anesthesia was made easy and the time very short.

The suspension method was considered; but here, again, the difficulty of preventing flooding of the sound lung made this impracticable.

Emil Mayer.

Temporary Loss of Voice Following Thyroidectomy.

GUTHRIE, DONALD.

J. Am. M. Ass., Chicago, 1918—LXXI—715.

The causes of temporary loss of voice may be put under four headings: (1) Trauma of the inferior recurrent laryngeal nerves; (2) trauma to the larynx and trachea; (3) syphilis, and (4) hysteria.

The anesthetist can give valuable suggestion to the subconscious mind during the early stage of anesthesia. Our nurses are trained to make all of our thyroid patients talk in their drunken ether state. They must be made to articulate some word. This is carefully noted on the chart, and should the patient lose her voice it is no source of anxiety to any of us. Occasionally it is impossible to get a patient to talk immediately after operation, and these are the patients who do worry us—but I know of no patient of mine who has had any permanent disturbance with speech.

The postoperative laryngoscopic examination is of importance, for if bilateral adductor paralysis alone is present it is surely due to hysteria. Most of the patients recover within from a few weeks to a few months with the proper kind of suggestion, but the rebellious case may worry the surgeon and startle a community for the time being. All forms of suggestion have been employed, from the mildest to the hypnotic. It is often necessary to treat the patient's family as well as the patient. We use repeated laryngoscopic examinations, with assurance, the battery, the therapeutic lamp, and gentle massage to the muscles of the neck. In the purely hysterical type there is complete restoration of the voice as soon as the patient can be convinced that she can talk. Judd tells of a patient who feared she would lose her voice after operation, which she did for months. She believed that if an adhesion was loosened in her neck her voice would return. She was anesthetized, the muscles of her neck were massaged. Her voice returned at once. Sistrunk had a patient who was given mild anesthesia and was merely assured while going to sleep that her voice would return. She talked as soon as she awakened. One of my rebellious patients had to be hypnotized twice. Another,

whose family could not be convinced that permanent damage had not been done, was made to relax the muscles of her throat, and take a deep inspiration with her mouth open. She made a loud crowing sound. Her mother who was present cried out, "Her voice has returned." She was able to talk at once.

Communications from different men doing thyroid surgery show an average of from 3 to 5 per cent of cases of temporary loss of voice, and from 20 to 50 per cent of huskiness and 3 per cent of temporary loss of voice since employing the methods herein described. This is a much smaller number than formerly when he did not carry out measures to safeguard the nerves and the trachea from trauma and did not consider hysteria as an element in producing the complication. These conclusions are based on a clinical study of 1,102 goiter patients, 619 of whom were operated on. Emil Mayer.

Esophageal Diverticula.

JUDD, E. S.

Surg., Gynec. and Obst., Chicago, 1918—XXVII—2.

In thirty-five cases in which operations were done in the Mayo Clinic there were two deaths. In each instance death occurred on the second day; both patients were very old and feeble. The cause of death in both instances was cardiac disorder. One died after the first of a two stage operation; one after excision of the sac and inversion of the base. In one of these, because of many general contraindications to operation, the patient was taught to pass a stomach tube, and for some months he lived by feeding himself in that manner; then the sac became so large that it produced a great deformity in the esophagus. The patient could no longer pass the tube, and an operation seemed imperative. The first stage of the operation was performed, but death took place suddenly the next morning. The history of the second patient is much the same, except that the sac was smaller and was removed at one operation. This patient also died the morning following the operation. In two of the remaining cases, there was some evidence of a recurrence of the diverticulum. One of these patients was entirely relieved by passing a sound a few times, and in

the other case it was necessary to reoperate for the recurrence. When heard from recently nearly all of the thirty-three patients were entirely free from symptoms. The writer believes that the infolding operation and the two stage operation are the procedures preferred and can be performed with practically no mortality. In operating on these cases, the approach was from the left side of the neck in all except one case, and that was from the right side. In six cases a transverse incision was made. One patient had been operated on for diverticulum one year before coming to the clinic. There was recurrence in one case. The patient began to have trouble about one month after operation, and was operated on nine months later by the two stage operation. This was the only recurrence in the series. The sac was excised and the base inverted and turned in in four cases. The Bevan operation was done in three cases. There were two deaths following operation, both on the second day. Both patients were known to be poor surgical risks; one a male, aged seventy-six years; the other a male, aged seventy-three years. Emil Mayer.

Warfare Injuries of the Larynx.

HARMER, W. D., London, *Lancet*, 1918—II—839.

The writer's statistics and conclusions are based on two hundred and forty-five collected cases. It has been noted that wounds of the larynx are infinitely rarer than wounds of the jaw; that the entry wound may be situated in any part of the neck and is generally smaller than the wound of exit; that the commonest place of entry is the anterior triangle of the neck, especially the region of the thyroid cartilage; that transverse wounds are more common than oblique; that injuries of the larynx between the level of the vocal cords and the cricoid are the most serious; that tracheal wounds are rare; that extralaryngeal wounds are very common, the air passages escaping by their mobility and the missile passing obliquely by the thyroid cartilage or transversely behind the larynx without penetrating its cavity. Out of 103 cases the wounds were caused by bullets in 58, shrapnel in 20, shell fragments in 16, bayonet 1, not stated 18.

In many of the cases examined the classical symptoms were remarkable by their absence, although the missile had undoubtedly perforated the air passages. Hemoptysis is common and may be severe. In general, the voice is immediately lost. Cough supervenes for a time. Dysphagia is common, but generally of a transient nature for a day or two. Dyspnea is variable and is often absent, even from severe wounds. It may, however, develop unexpectedly after apparently simple injuries and at almost any period.

In the early stages the first essential is to prevent the patient from choking, and even in all doubtful cases tracheotomy should be done. Cricotracheotomy is easy but inadvisable; high tracheotomy through the upper rings is less dangerous than a low operation. Free drainage of the wound of injury must be maintained, and foreign bodies removed in all possible cases. The later treatment should be carried out by laryngologists. Mortality is high, he states, but in 108 cases described in detail, there were only five deaths. In two-thirds of the gunshot injuries of the larynx that survive for more than a week, recovery is complete save for alteration of voice. In 108 cases the voice became normal in 17, strong hoarse, 24; weak hoarse, 12; falsetto, 1; whisper, 15; dumb, 1; not stated, 38.

—Survey of Head Surgery, Surgeon General's Office.

Contusion of the Larynx.

THOLLON AND LABERNADIE,

Rev. hebdomadaire de laryngologie, etc., Paris, 1918—XXXIX—317.

The authors have seen four cases of contused war wounds of the larynx. In each instance the projectile inflicted a glancing injury, producing a superficial wound without fracturing the cartilage. The patients stated that, at the moment, they felt the shock to the laryngeal region like a sharp blow which cut off respiration for a few seconds. Subsequently hoarseness was almost the only symptom. Radiography excluded the presence of any foreign body. Laryngoscopy showed in each case a bluish ecchymosis, varying in dimensions, but always localized to the periphery of the upper

larynx. There was no tenderness to pressure; no spontaneous pain. In one case, for example, there was a bluish ecchymosis with a submucous extravasation of blood, extending from the larynx to the velum palati and spreading into the right glossoepiglottic groove. The swollen ventricular bands almost concealed the vocal cords; the latter were slightly infiltrated. The laryngeal mucosa was reddened. In another case there was an ecchymosis in the left glossoepiglottic groove and a second lesion in the arytenoepiglottic region, with great edema of the left ventricular band.

Treatment comprised rest and insufflation of Lubet-Barbon's sedative powder (morphin). The ecchymoses disappeared about the twentieth day.

—Survey of Head Surgery, Surgeon General's Office.

Concerning Nerve Implantation in Recurrent Laryngeal Paralysis.

HOESSLY.

Beiträge klin. Chir., 1916—XCIX—186.

Hoessly, following the work of Erlacher and v. Hacker on direct nerve implantation into the muscle, severed the recurrent laryngeal nerve in three dogs and removed six centimeters from the nerve. A part of the spinal accessory was implanted into the laryngeal musculature. Laryngoscopic examination was done immediately after the operation and showed the vocal cord on the operated side to be in the cadaveric position. Five months later another laryngoscopic examination was done immediately after the operation and showed the vocal cord on the operated side to be in the cadaveric position. Five months later another laryngoscopic examination was made, and in one of the dogs there was still complete paralysis, whereas the other two showed normal vocal cords. The dogs were then killed. The last were stained according to the method of Bielschowsky and the former was imbedded in celloidin and stained with hemotxylin and eosin. In the two with normal vocal cords it was found that "new nerve fibers had grown into the musculature and in normal manner had come into contact with muscle fibers. Atrophic parts of the muscles were wanting."

—Survey of Head Surgery, Surgeon General's Office.

V.—MISCELLANEOUS.

Hypophyseal Tumors Through the Intradural Approach.

ADSON, A. W.

J. Am. M. Ass., Chicago, 1918—LXXI—721.

The technic herein described is of an intradural approach after an osteoplastic flap has been turned from the right frontoparietal region. The dura is opened widely to permit the exposure of the frontal lobe, which is protected with cotton and rubber tissue. The lobe is then elevated gently until the optic commissure and the hypophysis are exposed.

The operation is fully described with a report of six cases.

In two of the group of six cases, the patients presented very definite bitemporal hemianopsia, with more or less complete loss of vision in the left eye. One patient had a complete loss of vision in the right eye for a period of ten years, and a left temporal hemianopsia; one presented a typical acromegalic syndrome with a temporal color hemianopsia and constricted object field; one had bitemporal hemianopsia with more or less distorted fields in the left eye, and one had blindness in the right eye with definite neighborhood symptoms producing a frontal lobe syndrome of pressure and localization, involving the uncinate gyrus. Postoperative convalescence was uneventful and rapid in all but one case, in which the patient died on the second day. In two cases there was complete restoration of vision, in two marked improvement in vision, and in one a relief from headache. In the case of blindness in the right eye which was complete for ten years, the patient has begun to have a return of vision. The patient with acromegaly is having metabolic changes. In five cases there has been definite improvement. In one, no visual improvement, but relief from pain was obtained.

The particular advantages of the operation are: 1. Its approach presents a dry field, free from infection and in which it is comparatively easy to expose the optic commissure and the tumor. 2. The exposure permits the dissection of the tumor from the optic nerves and the commissure, and the removal of all or any portion of the tumor and pituitary body that is desired. 3. Trauma of the commissure and nerves

is prevented, as the sponging is done against the floor of the sella instead of working upward against the commissure and nerve peduncles. So far as the operative risk is concerned, it is no greater than in craniotomies on the frontal lobe, depending a great deal, no doubt, on the experience of the operator.

Emil Mayer.

Military Surgery of the Ear, Nose and Throat.

LOEB, H. W.

Medical War Manual No. 8, Authorized by the Secretary of War and under the Supervision of the Surgeon General and the Council of National Defense.

As the author states in his preface, this manual is a review of the surgical literature of the war in so far as it pertains to the ear, nose and throat. In addition, the writer gives at the beginning of each chapter a summary of the facts and opinions gained from his own experience and from the literature.

INJURIES OF THE EXTERNAL EAR.

Wounds of the Auricle.—The following injuries may be sustained: (1) Complete or partial detachment or destruction. (2) Wounds of various portions, with or without laceration. (3) Perforations by bullets or shell fragment. (4) Embedding of metallic or other foreign bodies in the auricle. (5) Burns and scalds. (6) Contusions.

The aim of treatment should be not only to promote repair but to prevent infection and perichondritis and to avoid deformity. The wound should be carefully cleansed, contused tissues cut away, foreign bodies removed and cut surfaces sutured when possible. Great pains should be taken to prevent perichondritis and to avoid stenosis of the meatus.

Wounds of the External Auditory Canal.—The canal is subject to injury in various degrees by projectiles. Obviously the bony canal is frequently involved by the injury, and important structures in the neighborhood may be damaged, such as the facial nerve, the large vessels and nerves in the upper neck, the brain, meninges, and middle ear. Hemorrhage from the

ear and pain upon movement of the temporomaxillary articulation are the two cardinal symptoms.

Fragments of metal and other extraneous substances should be removed; a postauricular incision and slitting of the membranous canal may be necessary to remove foreign bodies. The inferior maxilla should be immobilized if the osseous canal is fractured. The membranous canal should be dried out, boric acid applied and dry gauze inserted.

Stenosis and atresia are the chief distressing results and may be caused by adhesions, cicatricial fibrous masses, and hyperostosis. Treatment is by plastic operation and this sometimes necessitates a mastoid operation, either simple or radical.

INJURIES OF THE MIDDLE EAR.

Tympanic Membrane.—Lesions of the membrane are very common, sometimes directly resulting from projectiles, foreign bodies or caustics, but more often indirectly from the concussion of high explosives. Perforations may occur in any part of the tympanic membrane, but are usually in the inferior half. Symptoms may be entirely absent; hemorrhage is slight, deafness is usually transitory and a serous discharge may occur for a few days, but pain is seldom present.

Suppurative otitis media is the common result. An effort should be made to avert it by dry cleansing of the external auditory canal and avoiding irrigation of the ear.

Tympanic Cavity.—Here direct injuries are often associated with trauma of the labyrinth and injury of the petrous bone and cranial cavity.

Early treatment other than dry cleansing is largely negative, all washes and manipulations being interdicted. Nevertheless, infection and suppuration of the middle ear is the rule, and complications such as mastoiditis and sinusitis may follow.

Mastoid Process.—Injuries are mostly direct and compound, and may extensively involve the adjacent important structures. The chief danger is infection and resulting complications. Unless the wound is of the grazing type a mastoid operation will be necessary.

INJURIES OF THE INTERNAL EAR.

The internal ear may be injured in three ways, viz.: (1)

Direct traumatism; (2) traumatism by propagation; (3) indirect traumatism.

Direct Traumatism.—Injuries of the internal ear are usually a part of a larger process involving the middle ear, external auditory canal and mastoid process. Treatment is the same as that for other cranial wounds when important structures are involved—absolute rest and as little manipulation as possible except to remove foreign substances. Operative procedures will depend on the nature of the case.

Traumatism by Propagation.—This refers to those cases in which the missile does not come in contact with the bony structures of the internal ear, but in which they are involved by extension from injury of neighboring structures. Fractures of the petrous are special examples. These are most likely to occur in the region of the tympanum, the cochlea, the carotid and jugular fossa.

Treatment is largely expectant, and injections should be avoided, even after suppuration appears.

Indirect Traumatism.—This comprises an exceedingly large group of war accidents and includes those cases of indirect injury resulting from the detonation of shells and guns of large caliber. As to pathology, it is probable that hemorrhages occur in the labyrinth, accompanied in the most severe cases by contusion of the membranous labyrinth, which destroys the terminal sensory cells and which may be followed by atrophy of the neurons.

The more common symptoms are loss of consciousness, deafness of variable degree and permanence, vertigo, tinnitus of short duration, spontaneous nystagmus directed toward the sound or least affected side, briefly disturbed equilibrium, nausea and vomiting, altered voice and general hebetude.

Rest in bed is the cardinal indication; the diet should be restricted and iced applications or leeches should be applied over the mastoid.

Psychoneuroses of Hearing and Speech.—The number of these cases is legion; they come under the general phenomena of "shell shock." Deafness, deafmutism, mutism, stammering and aphonia are some of the types. No organic changes are found. Besides the dominant symptoms there may be various neurotic manifestations. Diagnosis offers little difficulty save

in differentiating from simulation or exaggeration. Prognosis is almost invariably good.

Treatment is by some form of suggestion and reeducation.

RECONSTRUCTION AND REEDUCATION.

Reconstruction.—The general subject of plastics is assigned to another department, and hence it is not included in this manual.

Reeducation of the Deaf.—The principle of all sensory reeducation is the reawakening of a sense by its specific physiologic stimulant. For the deaf, reeducation comprehends: Reeducation by voice, sound massage by vibrating plates, auricular and respiratory gymnastics, diathermia and lip reading. Types of deafness suitable for reeducation include labyrinth concussion, chronic suppurative or catarrhal otitis media in which deafness has been increased by war conditions, and deafness of psychoneurotic origin. Lip reading alone is of value in complete bilateral organic deafness.

Reeducation for Speech Defects.—Applicable in mutism, stammering, aphonia and altered speech. Respiratory reeducation is the fundamental requirement, and may be supplemented by holding the larynx in its proper position and systematic exercises for the lips, tongue and muscles of the face.

MISCELLANEOUS.

Facial Nerve.—The nerve is severed or lacerated or compressed by bone or foreign bodies. Treatment consists in removing foreign bodies or bone fragments, bringing cut ends of the nerve together with or without suture, implantation of other nerve fibers or anastomosis with other nerves (hypoglossal and spinal accessory).

NONTRAUMATIC AFFECTIONS OF THE EAR DUE TO WAR

CONDITIONS.

From lack of cleanliness, lack of rest, exposure to cold, nervous tension, prevalence of infectious diseases and abnormal food conditions various diseases of the ear are perhaps more common than ordinarily.

Ear Defenders.—To prevent injury to the tympanum and labyrinth by concussion various types of ear defenders have

been devised, including cotton wads, diaphragm and ear plugs with a tortuous canal. The appliances at present used by the United States Army are the British Tommy (a hollow rubber nipple without any opening) and vaselized cotton.

INJURIES OF THE EXTERNAL NOSE AND NASAL CAVITIES.

External Nose.—Injuries comprise abrasions, contusions, slitlike wounds, penetrating or perforating wounds, detachment or destruction of part of all the external nose.

In the treatment of wounds of the external nose it is to be remembered that loss of tissue manifests itself by cosmetic deficiencies which may require plastic operation. Hence tissue should not be removed unnecessarily, and particles that can be saved should be properly sutured. If the nasal bones are depressed it may be possible to elevate them. Whatever is done, the patency of the nares should be preserved and stenosis avoided by using hollow splints or gauze packing.

Injuries of the Nasal Cavities.—These comprise wounds of the septum, turbinates, floor and roof of the nose.

Hemorrhage should be arrested, foreign bodies and detached fragments of bone removed, and if the septum is fractured or displaced it should be replaced in proper position. Infection is the rule. Adhesions and stenosis are difficult to avert, but an effort should be made to prevent them by using hollow splints or gauze packing.

INJURIES OF THE ACCESSORY SINUSES.

These are associated, as a rule, with wounds of the nasal cavity and adjacent structures. The wound treatment comprises whatever is required for the accompanying wounds, removal of foreign bodies, etc. Infection and suppuration may be expected, and operation may be necessary. Intranasal operation in such cases is usually insufficient and external operation will most often be necessary.

INJURIES OF THE THROAT.

The sternomastoid, trapezius and the other cervical muscles are most frequently concerned. When severed the cut ends will unite in the majority of cases, but suture may be necessary. When any of the numerous great vessels in this region are implicated severe, often fatal, hemorrhage follows. Even

a small vessel in the pharynx or larynx may cause hemorrhage of serious moment. The nerves usually affected are the vagus, recurrent, spinal accessory, superior laryngeal and glossopharyngeal. Endoscopy and radiography are of immense service in examination. Secondary hemorrhage, infection and pneumonia are common complications.

INJURIES OF THE PHARYNX AND ESOPHAGUS.

Little treatment for pharyngeal wounds is required beyond that for the external wounds. If the wound is in the oropharynx or laryngopharynx, no food should be swallowed for a time and the patient should be fed with a stomach tube.

Notwithstanding its protected position, the esophagus is wounded far more than might be supposed. It may be contused or perforated, or it may lodge a projectile. Wounds of the middle and lower portions are always complicated by a chest wound and are usually fatal. When the esophagotracheal wall is involved, particles of food are likely to pass into the trachea and cause pneumonia. Stricture of the esophagus will result if there is any considerable laceration of its walls. Treatment of all esophageal wounds is largely expectant.

INJURIES OF THE LARYNX AND TRACHEA.

Larynx.—Wounds of the larynx are of consequence not only from the standpoint of the primary injury, but also of the stenosis which usually follows. Dyspnea, hemorrhage, aphonia, emphysema, dysphagia and cough are important symptoms. Complications include perichondritis, edema, stenosis and local paralysis.

Early careful treatment is necessary. As little as possible of the laryngeal structures should be removed. Hemorrhage must be checked and respiration must be maintained, the latter often necessitating tracheotomy. Sutures are inadvisable unless the wound be very large, as they are apt to break as a result of coughing, and closing the superficial wound increases the liability to emphysema.

Injuries of the Trachea.—Wounds of the trachea are obviously apt to be fatal. In some instances early tracheotomy or insertion of the tracheotomy tube directly into the tracheal wound may prevent a fatal issue.

PARALYSIS IN CONNECTION WITH WOUNDS OF THE THROAT.

The nerves which may be involved include the recurrent laryngeal, superior laryngeal, vagus, spinal accessory, glosso-pharyngeal, hypoglossal and sympathetic, each with its characteristic symptoms. The paralysis may be transient or permanent, depending on the nature of the injury.

STENOSIS OF THE LARYNX AND TRACHEA.

The lumen of the laryngotracheal tube may be narrowed by foreign bodies, acute inflammatory processes, deformity from perichondritis, bilateral abductor paralysis, webs, adhesions and cicatrices.

Various methods of treatment have been devised, including:

1. Removing webs, adhesions and obstructing tissue endoscopically. Dilatation may be combined with this.

3. Webs and adhesions may be removed after thyrotomy or cricothyrostomy.

3. Dilatation with Mackenzie's, Schoetter's or Levy's tubes or Thost's wedges is successful in some cases.

4. Laryngostomy and cricotracheostomy may be done for the purpose of dilatation.

5. Other methods are more radical and include permanent tracheotomy by attaching the trachea to the skin, and extensive plastic operations on the larynx and trachea.

OTHER CHAPTERS.

The remaining chapters deal with miscellaneous nose and throat conditions, malingering, the ear and aviation.

Bibliography appended is voluminous. Albert Miller.

The Protective Qualities of the Gauze Face Mask.

HALLER, DAVID A., AND COLWELL, RAYMOND C.

J. Am. M. Ass., Chicago, 1918—LXXI—1213.

The writers present their suggestions for masks:

1. It is their belief that gauze of the quality of Lakeside (24 by 20) or L and L (28 by 24) should be used in four layers, B and B (32 by 26) in three layers, provided all persons are masked. In case only the infected are masked, Lakeside

(24 by 20) should be seven layers thick, L. and L. (26 by 24) six layers, and B and B (32 by 26) five layers. If the masks of this thickness are used, the ambulances and receiving offices and particularly the clothing of uninfected patients would probably not become infected.

2. Masks should be eight inches in length, with the edges turned in and stitched. They should be five inches in width.

3. Two braids should be used, each one yard long, and sewed along the upper and lower borders of the mask so as to leave a free end fourteen inches long at each side.

4. The masks should be marked on the face side by a black thread tied in the gauze.

Emil Mayer.

Experimental Lesions of the Hypophysis.

CHIASSERINI, A.

Policlinico, Roma, 1918, XXV, sez. chir., 26, 44, 87, 97.

The author performed 38 experiments on dogs. The hypophysis was inoculated with the germs of sporotrichosis and tuberculosis. He sums up the results as follows:

By the inoculation of sporotrichotic and tubercular pathogenic material into the sella turcica and hypophysis he obtained various modifications in the structure of the glandular portion of the hypophysis. There were on the one hand retrogressive and inflammatory changes which gradually ended in a complete substitution of the hypophysis with a tissue of inflammatory infiltration; on the other hand, hyperplastic changes, more frequently at the expense of the pars intermedia except in one case where the pars anterior was affected. The former were obtained chiefly when the inoculation was made directly into the hypophysis or in the sella turcica after a previous mechanical lesion of the hypophysis; the latter prevailed in the cases in which the inoculation was made into the sella turcica without any lesion of the hypophysis. The anatomic lesions which result in a reduction or a complete disappearance of the glandular parenchyma produce a syndrome of cachexia or pituitary asthenia with a marked modification of character (a tendency to solitude, irascibility, somnolence), of posture of the body (crouching or defecating attitude), of gait (incoordination, pareticospastic gait), progressive loss of

flesh, fall of arterial pressure, hypothermia, terminal coma. This syndrome may also be observed in cases where considerable portions of the glandular lobes are preserved if the glandular secretion is prevented from entering the circulation by detachment of the peduncle, by numerous hemorrhagic foci or by stasis.

The hyperplastic changes of the pars intermedia apparently result in a polyuria which is sometimes very marked. Changes in the pars anterior may result in inspissations of the skin and osseous proliferations which resemble acromegalia. The syndrome of asthenia or hypophysial cachexia appears after a few days of complete well being and progresses rapidly. In some cases the syndrome was modified by the prevalence or the attenuation of one or the other symptom.

The increase of the volume of the hypophysis (two to three times the normal size) or the substitution by inflammatory tumefactions does not per se seem to cause special symptoms. Localized symptoms, too, observed in a few cases (disturbances of vision and of eye movements) are more the result of irritation and inflammatory infiltration along the nerve fibers than of a true compression. Usually the perihypophysial inflammatory infiltration is superficial. When it is deep and grave lesions are observed in the walls of the third ventricle, the symptomatology seems to be modified in the sense of a prevalence of spastic conditions. At all events, perihypophysial lesions, even serious ones, are compatible with life for a few days.

Two Cases Illustrating Plastic and Dental Treatment

GILLIES, H. D.

Lancet, London, 1917—CXCI—850.

Case 1.—Reformation of the chin and lower lip by double pedicled bridge flaps and cartilage graft. This is shown by an attempt at restoration in that not uncommon class of gunshot wound of the jaw in which the whole body of the mandible and the soft overlying tissues have been blown away en masse. The author employs a double pedicled bridge flap from the scalp. By a bridge flap is meant one in which the pedicle lies over healthy skin, is divided from the grafted terminal portion after about ten days, and is then replaced into

its original position. The double bridge flap, though likely original, is merely the logical development of double pedicle embedded and single pedicle bridge flaps, and it combines the advantages of a double blood supply and of the provision of a flap well distant from the lesion.

The flap stretched from ear to ear across the vertex and was about three inches in width. Before bringing this into position the skin below the buccal opening was raised by incision and dissection and laid on the upper surface of a large osteocartilaginous graft from the seventh rib. This measured some six inches along its long convex border and was the shape of a boomerang; it included about one inch of the bony portion of the rib and was fixed by iron wire into the remains of the jaw, bone to bone on the left side, and cartilage to bone on the right, being fixed so that the point of maximum convexity of the cartilage became the prominence of the chin. The large scalp flap was then swung over the face into position so that it covered the upper, lower, and lateral aspects of the new "jaw," and sutured to the surrounding skin edges. The pedicles were cut on the eleventh day and returned to the scalp; the new blood supply of the grafted portion being satisfactory, there was no question of gangrene.

In planning this operation it was not expected that a good functional result would accrue, but some degree of mastication is yet possible where there was none, and the gain to the patient of having a chin and a full beard is almost certainly permanent. The secondary disability is a bare area on the top of the scalp, which is being epithelialized.

In criticising this procedure, the writer feels that it would be better either to insert a piece of metal or celluloid at the time the scalp flap is brought down, to be replaced later by an osteocartilaginous graft under more aseptic conditions, or else to embed the graft in two halves in the scalp some six weeks before it is swung down. In this event the graft, at a later stage, could be joined in the middle and to the remains of the jaw.

Case 2.—Restoration of the nose by dental splint and cartilage graft. The anterior part of the septum, with portions of both alæ, having been shot away, a considerable flattening of the nose resulted. The dental splint with a bridge on it

held the soft tissues of the nose up in place. He later inserted a piece of cartilage graft three inches in length, taken from the eighth rib. The cartilage was inserted in two portions through the columella; the longer portion was pushed in beneath the skin to form the bridge, while a shorter piece was embedded down the columella towards the maxilla so as to support the tip of the nose. Plastic resuture of the alæ to give symmetrical appearance was carried out at the same operation.

—Survey of Head Surgery, Surgeon General's Office.

Ear and Nose Manifestations of the Influenza Epidemic.

FETTEROLF, GEORGE.

Survey of Head Surgery, Surgeon General's Office,
1918—I—199.

The epidemic, as far as the upper air passages are concerned, has had several notable features.

1. The large number of serous or serosanguineous blebs, the so-called otitis externa hemorrhagia, which developed in the external canal. At first we opened these, but later we adopted the plan of not touching them unless they interfered seriously with a view of or drainage through the tympanic membrane. A curious and unexpected feature is that they were as sensitive to the knife as is the ear drum.

2. The large number of cases of middle ear inflammation without serious mastoid involvement. Since the onset of the epidemic we have incised about 150 ear drums and have seen at least that many more which have not needed incision. Possibly some were incised which did not need it, as we made it a rule to cut in all doubtful cases. But we feel sure that none which did need an incision failed to have one. At any rate, we have yet to see a real mastoid case. There has been a number of tender mastoids, but these all have resolved or are resolving without operation. To me, the selective affinity of the infecting organisms, in not invading destructively the mastoid cells, is quite noteworthy. Every case of middle ear pain in our Base Hospital has been promptly attended to, but even this could not adequately explain this remarkable escape of the mastoid from serious disease. Unfortunately,

no bacteriologic work on our cases has been possible. The laboratory was badly handicapped by sickness among the personnel, and only the more imperative work could be done.

3. The paranasal sinuses also seem to have escaped trouble. Of course, in the rush we have had, it is possible that cases of headache have not been ascribed by the Ward Surgeons to the proper source, but I feel that if the incidence of sinusitis had been at all great the attention of our Department would have been called to at least some of the cases.

4. Epistaxis. The frequency of epistaxis in the first 2000 cases I am inclined to ascribe to the train dirt to which they were exposed for two days.

Gauze Mask in the Prophylaxis of Contagious Diseases.

BERNARD, A.

Progrès méd., Paris, 1918—XXIII—175

Gowns do not protect from infection with contagious diseases. The germs are exhaled into the air and are inhaled by the attendant. Wearing a gauze mask seems to be very protective. From June, 1916, to December, 1917, not one of 173 nurses in the scarlet fever wards were infected, though there had been nine cases in the three years previous.

—Survey of Head Surgery, Surgeon General's Office.

Treatment of Facial Cicatrices.

POULARD, A.

Presse méd., Paris, 1918—XXVI—221.

Total ablation is suitable only for superficial and projecting scars; it is a bad method for deep ones, adhering to the bone, where it may lead to serious complications, such as reawakening a dormant infection. Also, sometimes the scar closes an opening into the facial or the cranial cavity, and it is dangerous to reestablish such an opening. As a substitute for total removal of these scars, the author has used the following method of operating:

(a) A deep incision is made all around the scar, well out in the healthy tissue.

(b) Then he dissects out the superficial, epidermized layer

which covers the outlined scar island. But only the most superficial layer should be removed, leaving in place the underlying cicatricial mass.

(c) Finally the healthy lips of the wound are rendered freely movable and are sutured over a thick mass of adipose tissue, which is placed over the cicatricial mass left behind.

—Survey of Head Surgery, Surgeon General's Office.

A Report on the Influenza Epidemic of 1918.

GOTCH, O. H., AND WHITTINGHAM, H. E.

Brit. Med. J., 1918—II—82.

The report is based on the first fifty cases occurring among the Royal Air Force at Hampstead Hospital. Etiology: Specific cause appears to be a gram negative micrococcus, perhaps in association with bacillus influenza, the latter being isolated in only eight per cent of the cases.

Incubation period, one to two days. Duration, three to five days, the five day type being more severe.

Chief symptoms: Sudden onset of malaise, body pains, headache, anorexia, constipation, cough, photophobia. Chief physical signs: High temperature, maximum on second day; tongue heavily coated; acute pharyngitis, stomatitis, gingivitis, conjunctivitis, albuminuria with hyaline and granula casts. Blood counts show leucopenia with relative neutrophilia at the height of the fever.

Treatment: Rest in bed; free movement of bowels; aspirin, grains ten, t. i. d. until temperature is normal; light diet.

—Survey of Head Surgery, Surgeon General's Office.

SOCIETY PROCEEDINGS.

ABSTRACT OF PROCEEDINGS OF THE TWENTY- FOURTH ANNUAL MEETING OF THE AMERI- CAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, ATLANTIC CITY, MAY 29 AND 30, 1918.

JOINT MEETING OF THE AMERICAN LARYNGOLOGICAL ASSOCIA- TION AND THE LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY.

Symposium Upon Bronchoscopy.*

REGULAR SESSION.

Localization of the Lobes of the Lungs by Means of Transparent Films.

CHEVALIER JACKSON, M. D.,

PHILADELPHIA.

For mapping out the outlines of the lobes of the lungs in a radiographic negative, the overlaying of the plate with a transparent positive outline film is very useful. It is necessary to have about twelve sizes of outline films of each of four points of view, front, back, right lateral and left lateral. These, with a moderate mental endowment of solid geometry will be of great help in localizing the outlines of the confusingly irregular lobar shapes.

Conditions Developing in Chronic Suppurative Otitis Media Which Should Constitute the Basis for Exemption From Military Service.

EDWARD B. DENCH, M. D.,

NEW YORK.

The writer classified the symptoms of chronic suppurative otitis media as those where there is a constant profuse discharge, a constant slight discharge, an intermittent discharge.

*See page 1140 to 1154, September Annals.

and where, in spite of the condition, the patient states that there is no discharge. From a military point of view, cases suffering from a constant profuse discharge should naturally be rejected for general military service, but not necessarily for limited service. In view of the fact that the quantity of the discharge gives very little idea as to the real danger to the patient, other symptoms, such as occasional attacks of vertigo and persistent headache, should lead to rejection for general military service in any case of purulent otitis media. Intermittent discharge from the ear does not disqualify for limited military service, and, in many instances, general military service is not attended with danger to the government or the patient.

All cases of middle ear suppuration are classified under six heads, according to the perforation: (1) Cases of small central perforation. The condition is seldom serious and is usually relieved by local treatment. (2) Large kidney-shaped perforation, without caries of the ossicles, and with mucous membrane of middle ear, dry or moist. Where the mucous membrane is dry and dermatized the patient is perfectly fit for military duty, provided the hearing comes up to the standard prescribed by the Government. (3) Large kidney shaped perforation with the presence of granulation tissue. These cases always have profuse discharge. The patients should be kept under observation, in a hospital, the granulation tissue removed, and the ear kept clean by irrigation. If, at the end of two weeks, the ears become dry or if there is only a slight discharge, the patients may be accepted for general or limited military service, depending upon the degree of hearing. (4) Perforation in the upper posterior portion of the membrana tympani, with a sinus leading into the tympanic vault, the lower margin of the membrane adherent to the tympanic wall, while the epithelium of the drum membrane spreads over the internal tympanic wall. These cases are prone to develop intracranial symptoms, and should not be accepted for general military service unless reconstruction is made, that is, unless the case is subjected to the radical operation. (5) Complete destruction of the drum membrane, with sinuses leading in front and behind the short process of the malleus into the tympanic vault. If these cases are dry they should be accepted

for general military service, provided the hearing is adequate to pass the test. With even a slight discharge, however, these cases should be rejected for general military service unless reconstruction is permitted. (6) Small perforation through the membrana flaccida, without the presence of granulation tissue. This condition is always indicative of intratympanic caries, and such a registrant should not be accepted for military service without reconstruction. This applies to all cases whether the discharge is constant, intermittent, profuse, or scanty.

Little importance is attached to the character of the discharge, whether seromucous, mucopurulent, or purulent.

The presence of labyrinthine symptoms in any case of suppurative otitis constitutes a basis for exemption. This would apply to all cases excepting those in which there was total deafness, a dead labyrinth, a dry ear, and in which the rotation test showed that compensation had completely taken place. A total deafness on one side would, according to the present rule, exempt the patient except for limited military service, and for this service he would certainly be competent.

The reconstruction of all cases of suppurative otitis media by radical operation in cases otherwise fit for military service is strongly urged. The same applies to cases in which labyrinthine symptoms exist. In cases of double suppurative otitis media the question of reconstruction is graver. The operation should be performed first upon the poorer ear, and, if this is successful, the other ear should be operated upon, thus rendering the patient fit at least for limited military service. The essayist was inclined to think the ordinary Base Hospital does not offer the ideal surroundings for these reconstruction cases. The Government could well make use of a large number of public institutions scattered throughout the country for this purpose.

DISCUSSION.

DR. TALBOT R. CHAMBERS, Jersey City, corroborated Dr. Dench's remarks. He recalled a meeting, a few months ago, at the New York Academy of Medicine, when a number of men reported having done the radical operation, some with primary graft. All agreed that the hearing was as good or

better than before operation in the majority of cases. A man with hearing of 20/20 in one ear and 5/20 in the other might be fit for the front line, but according to the regulations he would have to be rejected. It was just the same as with 20/20 vision in one eye and the vision of the other impaired. Such a man could go into service, but the regulations would not permit it. He thought many men had been thrown out on the first draft who would go in on the second.

DR. JOSEPH C. BECK, Chicago, had had considerable experience with one of the advisory boards in Chicago, and, as Dr. Chambers had said, it seemed a pity, in many instances, that a man otherwise healthy was thrown out because of slight impaired hearing, many of them being not only fit but anxious to go. Many of them were willing to go into a hospital for a radical operation, but the after treatment was so tedious that it would be a long time before they could go into service. At Camp Grant a number of men had been discharged on account of tubal secretion into the middle ear after an otherwise radically operated mastoid. In six cases he had been able to make the men fit for service by subsequent closure of the orifice of the eustachian tube. This was done by removing the mucous membrane both at the pharynx and in the middle ear, thus making a dry ear out of a discharging ear. The type of perforation had been clearly shown by Dr. Dench, and if the Advisory Boards received new orders along these lines a great many men would pass for limited service who had heretofore been rejected.

DR. WALTER B. JOHNSON, Paterson, said there was no commanding officer in his section, these cases being left to the general board. Ten feet with both ears was very poor hearing for a man who is to be under command in a noise. If one ear was 20/20 and the other was suppurating, the man could not be admitted. He had not found many men around Paterson who wanted to get out of service, and very few malingerers, as reported by Dr. Day; on the other hand, most of them were anxious to go. It seemed too bad that a man who had lost the vision of one eye but who had good vision in the other should be refused. He should be accepted for special service. The same applied to the hearing in nonsuppurating cases. As to the radical mastoid operation, many cases operated upon by

this method were not dry and never do get dry, and in such cases the regulations forbid their acceptance for service. A larger number of men should be drafted so that those who are physically fit could be selected. We must prepare for the organization of an overwhelming force over there, and to win the war we must have soldiers who can stand the pressure to the end.

DR. HENRY L. SWAIN, New Haven, thought both sides of the question very well presented. Dr. Dench had emphasized the view that men are able to serve even though they have some moisture and some damage to the drum, while Dr. Day had shown the probability of pension claims resulting from suppuration and its sequelae. The speaker took no chances, and, as a member of an advisory board, rejected all purulent cases unless dry for a long period. Once in a while it might be necessary, in the cantonments, to settle the question by operating, but this was not desirable.

DR. S. MACCUEEN SMITH, Philadelphia, had found many more cases of intracranial complications in the intermittent than in the continuous type. He considered it quite obviously true that the presence of a brownish yellow, foul smelling discharge indicated a more or less extensive bone necrosis.

DR. CHARLES W. RICHARDSON, Washington, agreed, in the main, with Dr. Day. He was a member of the Board which considered the examination of registrants and the preparation of the new set of rules for examination. He had insisted on the absolute exclusion of all suppurative conditions, all chronic suppurating ears, even though dry, and even for limited military service, for the reason that conditions are different in civil and military life. The experience of the British had been that if a man was inducted into service with suppurating ears he not only become unfit for service, but he became a source of danger to himself. It was unjust, therefore, to subject such a man to the casualties of warfare and to the dangers of disease which might cause his death as a result of exposure. But why create in the Surgeon General's office a machinery for the correction of these defects? Why not have the defects corrected in civil life? It was all right, perhaps, for Dr. Dench and those who did a supreme radical operation to hold that these men should be reconstructed, but even Dr. Dench and

others of like experience did not always get dry ears with the radical operation. Furthermore, if the man were reconstructed in the army it meant inactivity for three, four, or six months on the part of the man. And why, when physically perfect men are demanded, should the army be encumbered with men who require from four to six months to be in physical condition to be of service?

DR. CHRISTIAN R. HOLMES, Cincinnati, had given considerable thought to this subject since entering Camp Sherman last fall. He agreed with Dr. Richardson. It was a most serious proposition. When he first began to treat these cases, he asked the Division Surgeon to define the class that should be rejected. The reply was: "I cannot tell you. The Government's requirements are so difficult that it is up to you as an expert." He tried it, but the men had not been in the service more than a few weeks until, under the exposure incident to the training, they were back again. He was not convinced that only those should be accepted that were healed, or those in the first stage.

DR. ARTHUR I. WEIL, New Orleans, had had some experience in examining board work both before and after entering the service. In the examination of the first draft the instructions were to reject men with suppurating ears, and to exempt those who showed perforation of the drum membrane. Of course, at that time men were exempted more readily than now. After some experience in the cantonment he was convinced that the original plan was best, and that these men, now accepted, but formerly rejected, would have trouble when they get into active service. No man with an unhealed suppuration was a proper one to be sent abroad. He did not agree that the base hospital was the proper place for the radical mastoid operation. It might be advisable, as had been suggested, to persuade these men to go to civil hospitals as candidates for limited military service.

DR. A. P. VOISLAWSKY, New York, had been on the St. Luke's Hospital advisory board for a number of months, and of the men rejected for chronic suppurative otitis, not one had been induced to enter a hospital for a radical operation in spite of all the persuasive powers at his command.

DR. WELLS P. EAGLETON, Newark, wished to correct an im-

pression that seemed to obtain with reference to base hospital facilities for mastoid operations. Dr. Dench, Dr. Day, Dr. Richardson and others had expressed the opinion that these cases should be operated outside. He emphasized the fact that his experience had been that these cases heal more quickly and with better results than he had seen outside. The Government had put at the command of the operator men who could do bacteriological work or anything that might be required in a given case. Before he went into service he had had a very vague idea of the Carrel-Dakin method, because in hospitals it was used by internes and nurses, but with the organization made possible by the Government the use of the Carrel-Dakin solution in mastoid operations had become the routine treatment. Better results could be obtained with this operation in a military hospital than in a civil hospital.

Tests For Malingering in Defective Hearing.

PHILIP D. KERRISON, M. D.,

NEW YORK.

The essayist limited the discussion to the application of the tests for malingering. It is quite important, in dealing with suspected malingerers, to give not the slightest hint that they are in any way under suspicion. The more unsuspecting and credulous the examiner may appear, the more readily and conclusively will the examined respond to the tests. The most glaring evidence of deception should therefore pass without comment or apparent notice until the examination is completed.

Most malingerers of deafness who are subject to the military draft know that deafness of a certain grade in either ear will exempt them. Complete bilateral deafness, therefore, for various and obvious reasons, is rarely claimed. Two types of unilateral deafness are assumed: (1) Deafness advanced but not complete; (2) absolute deafness.

The tests upon the combined results of which the essayist has usually been able to base a definite conclusion are: (1) Weber's test; (2) the loud conversational voice test; (3) the binaural stethoscope test; (4) tests eliciting incongruous varia-

tions in response; (5) the noise apparatus-reading test (Lombard's test).

The method of examination employed is about as follows: Only one registrant at a time is admitted to the room. It is learned from him which ear is the deaf or deafer one, and whether he regards this deafness as partial or complete. If only one ear is complained of, a rapid test is made of the hearing of the better ear to determine that it is functionally sound or at least only slightly subnormal. This preliminary testing of the sound ear is essential to a proper interpretation of tests to be applied later. The tests are then applied in the sequence named above. If, with the Weber test, when the vibrating tuning fork of 256 double vibrations applied to the vertex of the skull, the sound is referred to the good ear, the examiner becomes skeptical and proceeds to the loud voice test. The registrant's eyes are blindfolded, he is requested to close with a finger the better ear, which has already been determined to be approximately sound functionally, and words and numbers are repeated, at first in a low voice and then in progressively louder tones. If, when a pitch and intensity have been reached at which he should be able to hear, he still states that he cannot, he is then known to be an intentional malingerer. He may claim, however, that he hears the sound through his occluded normal ear. The stethoscope test is then applied. One earpiece of an ordinary clinical stethoscope is completely occluded with wax. Standing behind the registrant, the stethoscope is adjusted, with the occluded earpiece in the "deaf" ear. After speaking in a low whisper into the funnel shaped chestpiece, the stethoscope is removed for the ostensible purpose of trying some other test, and then replaced, the occluded earpiece in the sound ear. If he hears approximately as well as before it is assumed that deafness is either assumed or grossly exaggerated. This is a fairly reliable test. In tests for eliciting contradictory responses the registrant's eyes are uncovered, the better ear is closed with a finger, and the "deaf" ear is subjected rapidly to the commoner classical tests, his responses being carefully noted. He is then blindfolded again and the same tests repeated many times, fairly rapidly and in varying order. The responses will almost surely demonstrate, in malingerers, incongruous and contradictory variations.

Lombard's test is one of the most dependable means of determining absolute or very advanced unilateral deafness. It requires a Bárány noise apparatus, and depends upon the fact that to the normal individual the sound of his own voice is necessary to the proper regulation of its tone and intensity. The man profoundly deaf, when told to read aloud in a natural voice and to continue to do so after the noise apparatus has been started, will continue to read in an even tone or in a tone only slightly elevated, whereas the malingerer will at once raise his voice or literally shout. This is a test which a malingerer who has been coached may easily turn to his advantage. Otherwise it is one of the most useful.

With a quiet room and sufficient time, there are few malingerers who will be able to deceive a careful and experienced examiner.

DR. WILLIAM B. CHAMBERLIN, Cleveland, had successfully employed the two-fork test, using two forks of the same pitch, making one with a louder tone vibrate before one ear, when the louder vibration would obscure the softer, held before the other ear. The ordinary cotton plug was fairly useful. When the vibrating tuning fork was placed on the vertex of the skull (Weber test), the individual had a preconceived notion, and although he would not try to deceive he would involuntarily say that he could not hear the vibrating tuning fork in the bad ear and that he could hear it in the good ear.

DR. KERRISON, in closing the discussion, was interested to hear the different experiences with reference to the frequency of malingerers in the different localities. In New York there were a great many malingerers. The tests he had reported were the ones used there. It has not been found necessary to resort to abusive measures or threats. Apropos of Dr. Day's experience, he recalled a case related by Dr. Lewis Coffin of New York, in which a man claimed extreme bilateral deafness. After most extensive tests the examiner was still in doubt as to the truth of the registrant's statements. He was sent out, and an orderly, trained for the purpose, went out with him, offered him a cigarette, and said to him, "How did you come out?" "Oh, I put it all over him!" replied the registrant.

Types of Mastoid Structure With Special Reference to Their Differentiation by Means of Stereoradiography.

F. N. BIGELOW, M. D.,

PROVIDENCE.

After reviewing the published opinions of others, the writer cited twelve cases, with illustrations. Before the advent of mastoid radiography there was no means by which the structure of a mastoid could be accurately determined previous to operation; consequently the mastoid structure received little or no consideration as a clinical factor. While it is true that the size and shape of the mastoid may give some clue as to the underlying anatomy, experience has proved that for the most part this is the merest guesswork. To determine previous to operation the size, distribution and approximate number of mastoid cells and the location of the sinus, the radiogram is the *sine qua non*.

The usual classification of mastoids into types according to cell structure (pneumatic and diploetic) is useful for clinical study and comparison only when it is made more descriptive and sufficiently comprehensive to include such other variable factors of mastoid structure as have clinical significance. Among these are the thickness and density of cortex and cell partitions, the number, distribution and arrangement of cells, and the location of the sinus. Both the diploetic and the pneumatic mastoid may be divided into three distinct anatomic types, each having both clinical and surgical significance peculiar to itself. The classification as given by Cheatle (infantile, diploetic, dense, mixed infantile and pneumatic with the infantile characteristics predominating) is accepted by the essayist, and illustrative cases are presented, with stereoscopic pictures giving the variations in structure. Possible variations of these types are discussed. Emphasis is laid upon the necessity of securing radiograms of good technical quality. The technic employed is detailed. The advantages of stereoscopic study of the mastoid are those which accrue to stereoradiography in general, and which have caused the marked increase in

the use of stereoscopic rather than flat plates wherever practicable.

An estimation of the technical quality of plates of the mastoid region is of extreme importance. When some or all of the mastoid cells are pneumatic, the character of the cell detail will furnish an index of plate quality. In a good plate normal cells should be definitely black, with sharp and clean-cut walls. If there is any generalized diseased process, other portions of the plate must be considered in judging quality. The temporomandibular joint, the auditory canal, and the lateral sinus are all regions that must be studied. They should be sharp and clear cut in a properly exposed and developed plate. The bone of the mandible should show its structure well defined. In addition, the character of the detail of the skull generally and of the sutures is of value. The ability to judge these points is of especial importance when examining stereoscopic plates, as then at least four plates are developed separately. A complete radiographic examination of the mastoid consists of a set of stereoscopic plates of each mastoid in the lateral oblique diameter, and one exposure of each mastoid in the anteroposterior diameter. A roentgen examination of this character and quality will in most instances reveal the type of mastoid, and this information should enable the observer to predict the clinical course and the prognosis of a middle ear infection with greater exactness, and to place therapeutic measures on a more scientific and less empiric basis.

Ear Protectors.

CHARLES W. RICHARDSON, M. D.,

WASHINGTON.

The Otolaryngologic Section of the Division of Surgery of the Head of the Surgeon General's Office, coöperating with the Research Committee of the Council of National Defense, with Surgeon G. E. Tribble of the Navy, and with Dr. Stacey Guild of the University of Michigan, undertook a series of experiments which have resulted in the finding

of a fairly serviceable protector that filled all the requirements as nearly as possible.

The conclusions drawn from these investigations are summarized, in part, as follows:

There is the immediate incapacity of the affected men for service, for a shorter or longer period, some of whom must be discharged.

As all men who are subject to injury of the auditory apparatus require medical attention, the time of medical officers, nurses and equipment could be available for other purposes.

The more severe cases result in permanent deafness, which, besides being a great handicap, impairs the soldier's later social and industrial life.

The subject of pension and compensation becomes an immediate financial consideration.

The causes of injuries may be divided into two different groups:

First.—Those which are due to a single detonation, or continued single detonations, such as artillery fire; and,

Second.—Those which are due to continuous sounds such as concussion of the air as produced by massed artillery and trench mortars and machine guns.

The character of the injury may be divided into three different groups:

First.—Rupture of the membrana tympani and other injuries of the conductive apparatus.

Second.—Those caused by organic injury from slight to complete destruction of the labyrinth.

Third.—A large number of cases which do not belong to either of these groups but in which both may be factors; functional disorders, most frequently of the central nervous system.

It has been the object of the Section of Otolaryngology to make a thorough and careful investigation of the various forms of devices that have been invented for the purpose of lessening these various disturbances. All of these have one single object: the lessening of the severity of the concussion impact, either of the single or continuous type, at its receptive point, the conducting apparatus of the ear. These

devices have as their primary conception that the injury produced by air concussion from detonation is transmitted through the conducting apparatus. All of them have the mechanical idea of lessening this condition by shutting off in various ways the force of the air concussion, and yet permitting sound waves to reach the membrana tympani so that the soldier may be protected yet hear. Necessarily most of these appliances diminish to a certain extent the hearing power. These mechanical devices have been tested on the living animal; have been tested physically to show how much each one permits the passage of the force of air concussion to the membrana tympani, and also rather imperfectly on the human subject, at such stations as Indian Head and the Navy Yard at Washington.

It is scarcely necessary to go into detail as to the various types of experimentation and the lines along which they are carried out. The simple results are presented, as follows:

There are three important features in the device: First, applicability; second, safety; third, cheapness.

All types of hard and metallic forms of protectors are dangerous, because in cases of gunshot wounds, shrapnel wounds about the auricle or canal, they are likely to become secondary foreign bodies. Therefore, mechanical devices can be eliminated, such as the Wilson-Michaelson and Mallock-Armstrong. Some of the cheapest, while fairly good protectors, should be ruled out, because they cut off the conduction of air sounds too greatly.

There is no question, through all the experimentation, that one actual protector has been found, that known as the "British Tommy," manufactured by George F. Berry, 4 Cullum St., Penchurch St., London, E. C. The device is simple, easy to introduce, causes no undue pressure, and is easy to remove. While it cuts down the hearing, it does not reduce it sufficiently to impair the voice beyond military needs. It prevents impact of concussion upon the membrana tympani, the conducting apparatus; it is safe; there is no possibility of forcing it in against the membrana tympani; it is not likely to be any more conducive to secondary foreign bodies than anything that could be worn in

the war, and it is comparatively cheap. Attached is a copy of contract which Mr. Berry was willing to make with this Government. In all the tests, as will be observed in the charts and exhibits accompanying this paper, it has proved itself the best protector. Actual experience upon the living has been impossible at this station, because of inability to procure the protectors. The one set transmitted with this communication is the only pair on hand. The cost is about one shilling a pair. They can be procured in London and furnished to our troops on the western front.

The next most satisfactory device is the Mallock-Armstrong, made by the Mallock-Armstrong Defender Company, 2 Palmer St., Westminster, London, S. W.

The only objection to the Mallock-Armstrong is that it is made of hard rubber and is apt to become a secondary point of foreign body injury. In other respects it is nearly as good as the "Tommy." It is not as easily introduced as the latter.

The next device to be presented is the Baum. This is very simple, very easily introduced into the ear, but not so easily removed. It can be worn for longer or shorter periods without causing any inconvenience to the patient. It is light in weight, and there are practically no dangers attendant upon its use as regards secondary foreign bodies. It is not nearly as good, however, as the other two previously mentioned. It does not give the fine degree of prevention as do the others to concussion impact, but it is an American invention and can be bought at a very reasonable price.

Reference should be made, before closing, to the Wilson-Michaelson device, which is planned somewhat on the type of the Mallock-Armstrong. It has a movable valve, which has been demonstrated under experimentation not to move as freely as it should under detonation. Under more forcible concussion, such as takes place in actual warfare, it might respond more favorably. It has the advantage of being a perfect conductor for the voice. It has the disadvantage of being made of hard rubber, and therefore possesses the danger of secondary foreign body injury. Ex-

perimentation shows it to be a little difficult to wear, and for long wear it would be inconvenient.

Cotton, saturated with glycerin or vaselin, is the cheapest of all, most available, easy to obtain, constantly on hand. It is practically within the reach of every soldier. The men are much more inclined to use cotton in the dry state. It is only when wet that it is of any value to prevent shock concussion. This wetting should be done by preference with glycerine or with vaseline. Either of these impairs the conduction of sonorous sound waves. Therefore, while it is the cheapest, the most easily available, the one most likely to be used, it has the disadvantage that it deafens the wearer more than any other.

It is suggested, in closing, that some arrangement be made by which several thousand of the "Tommy" could be purchased and supplied to the troops in the field.

It is also suggested that if any other form of mechanical apparatus, or of cotton saturated, is considered for use, it be bought in the same quantity and on the same conditions as the "Tommy," so that definite, actual warfare experiments can be used to determine which mechanical device or cotton is of the greatest value.

The Method of Analysis of the Barany Tests in Pathologic Cases.

LEWIS FISHER, M. D.,

PHILADELPHIA.

The writer presented a special chart which provides for all the salient features of the examination of the vestibular apparatus and for recording the various findings obtained by such examination. The first problem in any given case is whether one is dealing with a functional or an organic condition. If the chart shows all the responses to ear stimulation perfectly normal, a functional condition may be suspected. When the responses obtained on stimulation are not normal, the case should be considered as having an organic lesion. Such a deviation from the normal need not include all the responses. An impairment of even one response shows that one is dealing with an organic lesion.

Having concluded that the case presents an actual involvement of some portion of the vestibular apparatus, the next problem is to determine whether the case is one of peripheral or central lesion. This is the most important and at the same time most difficult diagnosis that the otologist is called upon to make. Many cases of cerebellar lesion or tumors of the cerebellopontine angle present symptoms similar to those observed in an affection of the labyrinth—the mis-called (according to the essayist) “Meniere’s disease.” On the other hand, the labyrinthine lesions not infrequently simulate cerebellar affections. The findings on ear stimulation are frequently the deciding factor in the diagnosis, and it therefore behooves the otologist to exercise the greatest care in determining this point. Some of the most important principles of this differential diagnosis are emphasized.

In a peripheral lesion all the responses are impaired, and conversely, the presence of any one normal response to stimulation indicates a normal labyrinthine and eighth nerve. A spontaneous nystagmus in the vertical plane, either upward or downward, indicates a central lesion. If stimulation produces a “perverted” nystagmus, then again the lesion is central. If the findings lead to the conclusion that the lesion is central, then our next problem is to attempt to locate the lesion more definitely within the cranium. The facility with which one is able to do this depends in a great measure upon how well one can visualize the various pathways constituting the vestibular apparatus. The simplest method of procedure is that of elimination. Beginning with the labyrinth, one proceeds brainward, considering each structure by itself. With good hearing and one or more responses on stimulation of the static portion of the labyrinth normal, the labyrinth itself and the eighth nerve are to be considered uninvolved. For information relative to the medulla oblongata and inferior cerebellar peduncles, one examines the responses obtained on stimulation of each horizontal canal separately. This test is performed routinely by tilting the head back 60 degrees after douching. If this produces normal horizontal

nystagmus and vertigo with past pointing, the medulla oblongata and inferior cerebellar peduncle of that side may be considered uninvolved. To determine the integrity of the pons, the response from the vertical semicircular canals are examined. These are tested when the ear is douched with the head 30 degrees forward—the so-called upright position. If the chart shows a normal rotary nystagmus with vertigo, past pointing and falling, it suggests uninvolved pathways in the pons and middle cerebellar peduncle of the side douched. The cerebellum is considered as not the seat of any gross lesion if stimulation of either ear or any canal produces a past-pointing of both arms in both directions.

With the chart critically examined in this manner, and all the possible points of involvement along the nerve tracts in mind, an attempt is made to find one location which would satisfactorily account for all of the impaired responses. Just as in neurology a certain group of symptoms occurring with a definite lesion are spoken of as the "symptom complex" for that lesion, so a certain group of phenomena obtained on stimulation has come to be recognized as the "phenomenon complex" for that particular lesion.

The essayist then proceeded to demonstrate his method of analysis by means of lantern slide charts, showing the brain and the different "phenomenon complexes." This method of analysis constitutes a means of approach in explaining the significance of impaired or absent responses to stimulation of the vestibular portion of the internal ear.

DISCUSSION.

DR. GEORGE F. COTT, Buffalo, said the otologist would encounter in future a great many toxic, neuritic and hysterical cases in which one response would be elicited, and then, after waiting five or six days, there would be no response from the healthy side and a response from the other. This was an important point. The technic of the examination was another important point. He cited an illustrative case, in which the patient, a woman, would be dizzy and would past point to the left every time a test was made. Finally

she was examined by Dr. Fisher and found to be absolutely normal. On account of the necessary technic the test would not be popular except with those who appreciated its vast importance.

DR. E. M. HOLMES, Boston, emphasized the point that brain tissue is compressible, and the last part pressed upon gives, at least temporarily, the more marked symptoms. Any examination, however accurate and critical, would give wrong impressions unless repeated a number of times. These cases varied from day to day. At autopsy it was amazing to find the extent of the lesion in the cerebellum or at the cerebellar pontine angle, where the symptoms pointed to a lesion at the pons or cerebellum, and where the tests were misleading. It should be borne in mind that the most perfect findings, applied theoretically, would be misleading in these cases.

DR. FISCHER, closing the discussion, said that his work represented conclusions drawn from examinations of hundreds of pathologic cases, many of which had been verified by operations or autopsy. The scheme of pathways and method of diagnosis of location of the lesions as shown had practically left the domain of the theoretical and had become eminently practical. He was not surprised that the findings in regard to nystagmus and vertigo often did not go together. The demonstration of that point was the object of his work. These represented two separate afferent impulses traveling along two distinct pathways. Under pathologic circumstances something might occur which would leave one system of pathways intact and impair the other. Of course the question, which Dr. Lewis and Dr. MacKenzie had emphasized, was important. Vertigo, being a subjective response, could not always be relied upon, as Dr. MacKenzie had suggested. Fair conclusions, however, could be drawn as to the condition of the cochlea from examination with tuning forks, in spite of the fact that those are based entirely on subjective responses. In a similar manner the experienced examiner of vestibular cases is able to differentiate vertigo responses that could be depended upon from those that could not.

**Spontaneous Recovery From Lateral Sinus Thrombosis. A Case
With Very Unusual Features.**

RICHMOND MCKINNEY, M. D.,

MEMPHIS.

The patient, a boy eleven years of age, had complained of earache for two days. The ear had been discharging intermittently for two months. Examination revealed a small amount of pus in the canal, with a median perforation of the membrana tympani. The boy's temperature at 10 a. m. was 100 degrees F. There was slight pain on deep pressure over the mastoid tip. Warm boracic acid irrigation and the use of the customary ice bag was ordered. On the morning of the third day he had a temperature of 104 degrees, rising to 105 in the evening. Blood examination was negative as to malarial parasites, but there was a polynuclear percentage of 92. No leucocyte count was made. The opening in the drum membrane was enlarged by a free incision, but no pus was seen in the canal. At 2 o'clock on the fourth morning the temperature was 105 degrees plus, but went down under antipyretic measures to 102.5 at 10 a. m., rising again to 104 by 3 p. m. No rigors, no sweats, or other indication of intracranial involvement, were noted. Reflexes were normal. After consultation it was decided to open the mastoid. The bone overlying the antrum was eburnated, with no pus, until the antrum was entered, when a very small quantity of pus and some granulations were encountered. The antrum was completely exenterated, leaving a perfectly smooth cavity, with no sinuses apparent in any direction. The temperature fluctuated and was reduced from time to time by ice water sponging. The patient slept a good deal. The afternoon of the day subsequent to operation he complained of pain in the right shoulder, he was chilly, and quite somnolent. On the morning of the tenth day the mastoid wound, when dressed, was found to be perfectly clean and free from pus. At this time the patient complained of painful spots at the end of the spine, where a small red swelling was noticed. Blood count, four days after operation, showed 6,200 leucocytes, with a polynuclear

percentage of 84. The tenderness beneath the right scapula had developed a swollen area, which, under light ether anesthesia, was opened, and teaspoonful of yellow pus, of ordinary staphylococcus variety, removed. Two days later a dram of pus was removed from the swollen area at the end of the spine. The chilly sensations and the temperature fluctuations were typical of sinus thrombosis, with occasional detachment of clots into the circulation. The abscesses were metastatic, confirming the suspicion of sinus thrombosis, other evidence of which was lacking. Eye grounds normal, no jugular rigidity or tenderness. Blood culture negative as to bacteria of any kind; leucocyte count not especially high, while polynuclear percentage was nearly normal at the last count. The mastoid was reopened and the lateral sinus explored. The sinus wall was greatly thickened and grayish, but a slight pulsation was noticeable. It was determined to wait a few hours before opening the sinus. The boy made an uneventful recovery, with no complications of any kind.

The essayist was convinced that there was a lateral sinus thrombosis, located above the knee of the sinus, but not occluding the sinus. The infection, in his opinion, took place through the venous channels, no involvement of bone anywhere being found. The quick change in the patient's condition after the second operation suggested that this exercised some influence.

DISCUSSION.

DR. WENDELL C. PHILLIPS, New York, said his attention had been called to spontaneous recovery of lateral sinus thrombosis during a long period of teaching operative surgery of the mastoid operation on the cadaver. During this time he had repeatedly discovered obliterated lateral sinuses, even in cases that had died from other diseases. But there was invariably evidence of purulent disease of the middle ear. From this he had become convinced that there was a certain proportion of cases in which spontaneous recovery from lateral sinus thrombosis took place, and that in every case the sinus was obliterated. His clinical experience had also borne this out and had convinced him that many cases of lateral sinus thrombosis, especially of atypical types, recovered spontaneously.

The friendly criticism was offered that this society should not give its approval of the use of the icebag in mastoiditis.

DR. GEORGE F. COTT, Buffalo, said many cases of lateral sinus thrombosis following suppuration of the middle ear did not come to operation because of spontaneous recovery. Many of the younger members of the profession were apt to operate whenever they found these typical symptoms; after more experience they were not so anxious to operate. No matter how much the temperature varied, the patient was not necessarily septic; they generally felt pretty well, slept well and had good appetite.

DR. E. M. HOLMES, Boston, had had better results in ligating the sinus and then using the curette. Secondary bleeding was rare after thorough removal of the clot.

DR. W. P. EAGLETON added that, from his own experience, he could state that the sinus could be ligated in any portion in three minutes. One could ligate above and below and obliterate the entire sinus.

DR. MCKINNEY, in closing the discussion, said he was glad to have had such a free discussion of his paper, but that the range of the discussion had not at all been confined to the subject presented by him. Indeed, he was rather reminded, by the trend of this discussion, of a conversation that occurred between two negro men who met in a country road. One of the negroes inquired of the other, "Say, nigger, whar is you gwine?" The other replied: "I'se gwine whar I'se gwine; dat's whar I'se gwine." So it was with this discussion, which ranged from the operative treatment of lateral sinus thrombosis to the question of the possibility of spontaneous recovery from lateral sinus thrombosis.

To Dr. Phillips' criticism of the use of the icebag, he would say that he was under the impression that most textbooks on otology mentioned this as a part of the routine treatment for mastoiditis, and even thought this was mentioned in Dr. Phillips' own book, but of course probably was mistaken. However, doubtless nineteen out of twenty otologists still use an icebag, to a certain extent, as this for a long time had been routine treatment. Personally, he had found neither advantage nor disadvantage from the use of the icebag, and did not advocate it as a routine measure, and in the case described

had really advised it more on account of the high temperature the boy was running, seeking the effect of ice in reducing high fever.

With regard to Dr. Cott's statement that this was not septic fever, he felt that if this was not, his teaching as to what constitutes sepsis had been erroneous. Certainly most of us have always thought that a normal or subnormal morning temperature, with a steady rise to 104 or 105 degrees, or higher, in the afternoon, then a rigor, with a sharp decline to normal or subnormal, was typical of sepsis, and he was afraid that if this was not true, all teachers and textbooks had been imparting faulty teaching. He wished to express his appreciation of the very generous and general discussion of his paper.

DR. COTT, replying to Dr. McKinney's request, reiterated the explanation he had given before the American Laryngological, Rhinological and Otological Society last year. The temperature, he claimed, was not due to sepsis, but to action of a proteolytic enzyme which digested the embolus, or fragment of an embolus, with an accompanying heat.

Chronic Sinusitis With Toxic Manifestations.

BY JOHN E. MACKENTY, M. D.,

NEW YORK.

The writer limited his discussion to two types of cases: manifest sinusitis with toxemia, and latent or concealed sinusitis with toxemia. Illustrative cases are detailed.

In all cases of chronic toxemia in which sinusitis is to be excluded as the cause, a detailed history should be taken, extending back to the limits of the patient's memory. The key to the whole situation may be revealed by the patient recalling the occurrence of an almost forgotten acute infection in the head. A former attack of influenza or of tonsillitis or one of the exanthemata, followed by an acute nasal infection, may awaken suspicion and start one on a still hunt for further evidence.

To set down a symptomatology from the study of sinusitis with toxic manifestations would be to invade the whole realm of toxic diseases, since all toxic diseases have symptoms in

common. In going over the histories of many cases, however, the writer found that certain characteristics take prominence: (1) History. The antecedent history generally reveals that the time of the onset is coincidental with an acute nasal or tonsillar infection. (2) Periodicity of symptoms. Remissions and exacerbations mark the progress of the disease as immunity is established or broken. It is noteworthy that in the worst cases these periods of immunity finally disappear as the patient sinks into a state of chronic intoxication. (3) Pain in the head. This is generally complained of either constantly or intermittently. It is located, usually, on the affected side, is frontal, retromastoid, occipital, or facial. (4) Pain in the neck. Its seat is over the trapezius and deltoid and it may radiate into the arm and to the occiput and mastoid. (5) Headache, which is to be distinguished from pain in the head. It may be deep-seated, central and bursting in character. It denotes sphenoidal congestion and in some cases may be accompanied by vomiting. It is probable that many cases of migraine are due to chronic sphenoiditis. (6) Mental depression, irritability, inability to concentrate, are frequently present, especially during acute or subacute attacks. (7) Nerve, joint and muscle pains may come and go with waxing and waning of toxic absorption. (8) Cardiovascular symptoms. The pulse rate generally exceeds the normal and is much increased by exertion. Under slight physical strain the pulse, during an acute attack, may go to 140. This irritability of the heart may be accompanied by dyspnea and oppression. (9) Temperature, as a rule, is remittent in type. In the more toxic cases, it may be continuous, with daily rise, usually at midday, to 100 or 101. It is aggravated by exercise. (10) Irritating gases, as formaldehyde, tobacco smoke, and exposure to cold and wind may bring on pains in the head or even precipitate an acute attack. (11) Blood and nutritional changes. Anemia and loss of weight, weakness and lassitude, are almost constant accompaniments of chronic toxic sinusitis. Long periods of seemingly good health, even years, may separate periods of activity in this disease. (12) Gastrointestinal symptoms. These may run the whole gamut in this region. Attention is directed to two suspicious manifestations: Spasm of the sigmoid flexure, and cecal pain.

Operation offers a fair prospect of cure. Some cases, however, are but slightly relieved, and it is suggested that these may be cases in which it is possible, later, to demonstrate deep-seated hyperplastic bone changes in the sinus walls. Too much must not be expected immediately after operation, as the cure may be delayed for months. Vaccines have materially helped in produced some final and permanent cures.

This condition may have its inception during childhood or early adolescence in some acute infection of the lymphoid ring of the nasopharynx. Many perplexing questions remain to be solved with reference to chronic sinusitis.

DISCUSSION.

DR. WILLIAM H. HASKIN, New York, called attention to the fact that the original monograph by William Hunter on focal infection gave almost every phase of the subject brought out today. It was one of the most important problems of the present time. Whatever the original cause, the important thing was to find the focus of infection. He could cite hundreds of cases of different conditions traceable to focal infection.

An Operation for Bony Occlusion of the Posterior Nares.

BY L. E. WHITE, M. D.,

BOSTON.

After reviewing the literature relative to bony atresia of the posterior nares and methods of treatment thereof, the writer described the operation which he devised and which he thought was original until he found that Katz had employed similar technic.

After a failure in his first operation, following Uffenorde's method, it occurred to him that if the raw surfaces were farther apart, the danger of closure would be greatly lessened; and remembering also that perforations in the septum usually stay open, it seemed the logical thing to make a perforation in the posterior end of the septum involving the obstructing choana. The operation may be performed under local or, preferably, under general anesthesia, especially when there is double occlusion. Deflection of the septum or hypertrophy

of the turbinates should be corrected before attacking the atresia, as it is essential to have the best possible operative field. After the free use of adrenalin to obtain a bloodless field, the bony plate can be readily perforated with a long flat chisel held close to the septum. A triangular section is first removed, the forefinger being placed in the posterior nares to guard against accident. The bone is next punched out as thoroughly as possible, and the rough edges smoothed off with a mastoid curette. When the atresia is bilateral the other side is operated on in the same way. The posterior end of the septum is then removed by rongeurs, and after being smoothed off carefully, it is covered by the mucosa which has been previously cut and elevated so as to leave enough for this purpose. All shreds should be carefully removed and the nose wiped clean. Each nostril is then packed with a strip of gauze covered with cargile membrane or rubber tissue. The packing should be removed in twenty-four hours, and the subsequent treatment is only such as is needed to keep the nose clean and free from crusts. If the operation has been done thoroughly no further packing is necessary, nor will there be need for the wearing of any of the many devices recommended to keep the opening patulous.

Two cases successfully operated upon by this technic are reported and illustrated.

DISCUSSION.

DR. J. E. MACKENTY, New York, recalled having reported two cases, in 1896, of choanal obstruction, in which he advocated removal of the posterior part of the septum or the setting forward of the choanæ. A cure would not be obtained unless this were done, but the procedure would cure practically every case. Many of these cases die at birth.

Adenosarcoma of the Nose. Report of Four Cases.

BY LEE M. HURD, M. D.,

NEW YORK.

From the clinical and microscopic findings, it is hardly possible to determine, in the early stages, whether the growth is of a benign or malignant character; all such growths, there-

fore, should be looked upon as of low grade malignancy. Adenosarcoma is conceded by some pathologists to be the most frequent form of malignant disease of the nose. Though it is the least malignant, two of the cases reported had recurrences after most extensive excision. Polyps were associated with two of the cases reported.

Two Cases of Latent Mastoid Suppuration; Perisinus Abscess; Operation; Recovery; X-Ray Findings.

By WILLIAM B. CHAMBERLIN, M. D.,

CLEVELAND.

Two cases reported emphasize: (1) The mildness of the initial symptoms; (2) the length of time elapsing between the initial symptoms and the more evident signs of mastoid involvement; (3) the extensiveness of the latter as disclosed by the operative findings; (4) the value of stereoscopic X-ray examination of both the normal and suspected mastoids in the diagnosis of cases of obscure or doubtful diagnosis. The cases further emphasize the danger of pus under pressure, and the rapidity with which osteonecrosis occurs when the bone is subjected to its ravages. In each of these cases a large cell was found at the mastoid tip, and in each pus under extreme pressure was encountered. As a result, there was a rapid erosion of the bone overlying the lateral sinus. Fortunately, in each case there was a concomitant effort at repair, as evidenced by the protective granulation which covered the sinus. These cases also show the wisdom of exercising the greatest care, when protective granulations are encountered, in leaving them undisturbed, unless positive indications of the involvement of the interior of the sinus are already present.

DISCUSSION.

DR. PHILIP D. KERRISON, New York, said the clinical histories reported by Dr. Chamberlin were particularly interesting, first in showing the conservative processes which frequently protect the sigmoid sinus during mastoiditis; second, in drawing attention to what Dr. Chamberlin called latency in mastoid disease, and third, in emphasizing the importance

of X-ray work in these cases. We are all familiar with cases of intrasinus involvement in which the outer sinus wall exposed during examination shows no macroscopic signs of disease. On the other hand, a sinus wall, thickened and covered with granulations, after removal of contiguous diseased bone, very often goes on to uneventful recovery. Dr. Chamberlin's term, "latent mastoiditis," is a very useful one. It describes a large number of cases in which the patients are admitted to the hospital for observation rather than immediate operation. Many such cases come to eventual operation, but large numbers recover wholly without surgical intervention. Periodic X-ray pictures in such cases would throw considerable light on processes of repair, about which we actually know very little.

The speaker referred to a case which had recently come under his observation, in which an X-ray picture showed positive involvement of the mastoid cells of the left side. This patient was not operated on and went on to apparently complete recovery. An X-ray picture taken two months later showed very distinctly the process of repair—i. e., the cells previously involved being very largely cleared up and showing approximately the appearance of the opposite sound mastoid.

DR. TALBOT R. CHAMBERS, Jersey City, had had hundreds of cases of aborted mastoid disease in which he had ordered twenty minutes of icebag and forty minutes of hot water.

DR. ARTHUR I. WEIL, New Orleans, had always thought the X-ray most useful in making a diagnosis of mastoid diseases in uncertain cases, also as a confirmatory measure in cases in which the diagnosis had already been made. He had always had his diagnosis confirmed by X-rays in cases on which he operated. He had had no experience with stereoscopic plates. The X-rays did not deceive; when they showed destruction of mastoid cells, the disease was there. He referred to two cases in which there was a little deception. In each case there was mastoid involvement, the history in each covering two years and more, during which time there was slight discharge and slight ear disturbance, lasting for a day or two at a time. One complained of facial paralysis, the other of headache on one side, and some mastoid pain and a feeling of malaise. Both showed the same picture, and in each the

diagnosis was mastoiditis. He operated, expecting to find latent mastoiditis with destruction of cells, but he found in each complete sclerosis. The mastoids were not diploetic, but were completely sclerosed, showing that the condition was very chronic. After operation each case cleared up completely. There was no latent mastoiditis, in the sense of pus and destruction.

DR. CHAMBERLIN, in closing the discussion, agreed with Dr. Kerrison's contention that the history and, above all, the clinical findings, should take precedence over everything else in diagnosis. He would not perform a mastoid operation on X-ray findings alone. X-ray findings would help in just this class of cases more than in any other. There was need for the taking of more serial X-rays in cases of otitis media which have gone on to resolution. It was difficult always to say that this cloudy cell would go on to resolution and another to suppuration.

The Pathogenesis of Bronchial Asthma.

BY WOLFF FREUDENTHAL, M. D.,

NEW YORK.

The writer does not accept the general belief that an attack of asthma is characterized by a constriction of the bronchioli traceable to the vagus nerve. While he is not able to prove that this view is not correct, he believes that an attack is brought about not by a spasm of the constrictor fibers coming from the vagus, but rather by a paralysis of the dilator fibers. This accords with his view of the etiology of asthma in general. The unusual occurrence of a spasm lasting for such a long time, as it often does in bronchial asthma, would seem to favor his view that in so-called spasmodic or bronchial asthma one is dealing with an atony or paresis or paralysis of the bronchiodilators and not with a spasm of the constrictors. The sympathetic system is also of great importance in this connection. The ramifications from one system to the other are numerous, and there may be no disturbance of the sympathetic when the symptoms incline toward an irritation of the vagus, and vice versa. While the action of these nerves is not clearly established, other symptoms apparently favor

his theory. For example, the abdominal muscles that are concerned in expiration are quite flaccid even during expiration, which could not happen if a spasm of the expiratory muscles had been present. Another point in favor of his theory is the frequent development of pulmonary emphysema, which, it has been said, is promoted by atony or paresis or paralysis of the smooth muscles of the bronchi. Atony never means spasm. Nor is it necessary to demonstrate a spasm of the inspiratory muscles, for at the beginning of the asthmatic attack the patient has difficulty only in expiration, which means that through a paralysis of the dilator muscles the others gain mastery and contract. Later on during an attack, when the lungs become overdistended, there is difficulty in inspiration as well. It has been found, however, by fluoroscopic examination, that the lungs do not expand and that the diaphragm remains stationary. This is an important finding, as the diaphragm under normal conditions is the main factor in inspiration, a factor that has been eliminated entirely through atony or paresis or paralysis in an acute attack.

Another point in favor of the theory advanced is the action of adrenalin and other drugs. When injected subcutaneously or applied endobronchially in an acute attack of asthma adrenalin produces an almost immediate effect thought to be a dilatation of the bronchioles. It has been found, however, by experiments upon rabbits and cats, that adrenalin usually produces "unmistakable constriction of the bronchioles." But when the bronchioles were initially constricted by other drugs, the normal effect of adrenalin was reversed and bronchial dilatation was produced. Besides, adrenalin acts only on those tissues which are innervated by the sympathetic nervous system.

It may be concluded that paralysis of the sympathetic and stimulation of the vagus show the same symptoms and are closely related not only symptomatically but also etiologically. As long as this fact stands, so long is one justified in speaking of the asthmatic paroxysm as due either to an irritation of the vagus or to paralysis of the sympathetic. The essayist, for the reasons stated, is inclined to the latter theory.

A further point in favor of this theory is added: The essential distensible air spaces of the lung are the infundibula, or

the terminals of the bronchioli. As the infundibula are regulated by the musculature of the bronchioli, these are justly mainly considered. The asthmatic sufferer involuntarily endeavors to keep his infundibula filled—that is, to keep his lungs in an inspiratory position. In that way he reinforces the elastic powers which dilate the bronchioles, and thus aids expiration. But since these elastic powers are out of function through some kind of paresis, no deep inspiration can be taken, no expiration aided in that way.

In conclusion it must be acknowledged that the constrictor muscles of the bronchioli during an asthmatic attack are not in a spasmodic condition, as heretofore accepted, but that they are in a state of artificial tonus brought about by the paresis of the inspiratory muscles.

Plastic Surgery of the Head and Neck.

BY THOMAS E. CARMODY, M. D.,

DENVER.

The writer enumerates certain points of technic which should be borne in mind in this field of surgery, some of which are given below. The stress laid upon the blood supply of the face as being all sufficient, in the plastic surgery of the face, has led to false conclusions as well as to carelessness in the handling of flaps. The location of incisions is very important in any operation about the face, and attention thereto may obviate the necessity of many secondary plastic operations. They should be made parallel, if possible, to a muscular fold. They should be slightly curved rather than straight, and parallel with the lines of the face rather than across them. Apposition of the edges must be accurate if scarring is to be avoided. Incisions made obliquely to the surface approximate more nicely and with less scarring than those made at right angles. Incision should be avoided close to bone on account of the tendency to tie down, which is so frequently seen where an abscessed tooth is opened on the face. An abscess, if possible, should be opened through sound tissues, unless the tissue is necrotic, at the most prominent point.

Flaps must be taken in the direction of the blood supply; they must be of sufficient length to reach the defect without

tension; they must be well approximated by sutures or dressings. Subsequent tension by muscular strain of any kind must be avoided.

Unnecessary removal of bone or tissue in either congenital or traumatic cases is to be avoided, where there is a possibility that the tissue may be visible. Loose teeth should be saved, if there is not a great amount of infection, and these, with their bony sockets, may be of value in supporting flaps.

Flaps may become gangrenous from lack of blood supply, from pressure of dressings, or from twisting of pedicle, either of which will produce dry gangrene. Moist gangrene may result from infection. In the latter case, active irrigation with soda solution or some of the newer solutions, as the Carrel-Dakin, is required.

Healthy tissue, without scar, should always be used, especially in secondary operations. Coaptation is interfered with if scar tissue is left, even on the edge of the flap.

The essayist's preference is to leave a wound to heal without dressing, as the protection of the scab formed by the drying of the serum is sufficient.

Sutures of silkworm gut, horsehair, and in some cases metallic sutures, and, where it is necessary to suture the mucous membrane, fine catgut, are used. The method of introduction of sutures may determine the result. Continuous sutures, either completely through the skin, or the so-called subcuticular, may be used. Interrupted sutures are more frequently used, but care must be taken not to turn the edge of the tissue. This may be avoided with better approximation by using the staple or the mattress suture. Sutures should be removed in the shortest possible time.

DISCUSSION.

DR. WILLIAM W. CARTER, New York, was glad to see that plastic surgery of the nose and face was coming into its own. He had been particularly interested in depressed deformities of the nose due to disease and to traumatism. Ten years ago he had presented before this Society his bridge splint, an instrument which he had devised for the correction of depressed and irregular deformities of traumatic origin; shortly afterwards he began to use bone transplants taken from the rib

for the correction of those cases in which there had been a considerable loss of the bony framework of the nose and which were not amenable to the bridge splint. The excellent results which he had secured by these methods in the large number of cases which had come under his observation led him to speak highly of their efficiency.

Dr. Carter demonstrated by lantern slides some of the results secured by his methods, and described the use of the bridge splint and his bone transplantation operations. He also showed by X-ray lantern slides the changes which occur in transplanted bone, in some instances the bone having been transplanted ten years ago. These cases showed that the transplant is not absorbed, but that it lives and grows, its growth being governed by the functional demands of the part. He advised the use of the costal tissue, the periosteum on one side of which is to be preserved. In some instances he used a transplant removed from the costal end of the rib, composed of two-thirds bone and one-third costal cartilage; this preserves the flexibility of the nasal tip. In marked depressed deformities he often superimposes several fragments of bone. This is preferable to the use of a single large transplant, as the small pieces have relatively greater osteogenetic capacity. Dr. Carter expressed a decided preference for the rib for transplantation purposes and said that he had never experienced any difficulty in removing a two-inch fragment and that the space is soon filled in by bone growing from the cut ends of the rib. In none of his cases have any dangerous complications followed this procedure, and the patients, as a rule, are discharged from the hospital in from five to seven days. No scar follows this operation, as the transplant is introduced from within the nose. The upper end of the transplant is securely anchored under the periosteum over the frontal bone, with which it forms a firm bony union. The correction of the deformity is permanent.

DR. LEE COHEN, Baltimore, said the required thickness of the transplant was the point which decided whether the tibia or a rib should be used. If a long thin span was needed he used a rib. He never used the entire thickness of the rib. Instead of taking out the entire rib he made a pattern of a metal strip the size of the piece of bone he wanted to use, sterilized

it, exposed the rib, laid the metal strip on it and marked out the size of the piece to be removed, the upper two-thirds over bone, the lower third over the sternocostal cartilage, so that bone is used in regions where bone existed in the nose, and cartilage below, where cartilage should be. The outer table of the rib, down to diploëic structure only, is used, this being removed with narrow straight chisel. The thin plate of bone for the transplant, the size of the metal strip, is removed and transplanted over nasal dorsum through an incision within the nasal vestibule. By taking a thin strip of the rib there was no danger of sepsis, and if the work was done carefully the pain in the chest is reduced to a minimum and there would be per primam healing. The discomfort and inconvenience from cutting the rib through was thus obviated. All his work was performed from the interior of the nose, no incision being made from without. He used a quadrilateral strip of costal cartilage, anchored at the nasal spine below and extending upward between the two layers of septal mucous membrane in contact with the transplant on dorsum nasii above, whenever the quadrilateral cartilage of the nose has been destroyed by suppuration or trauma.

DR. OTTO J. STEIN, Chicago, thought the paper would have been more valuable if more detail had been given of the method employed. Referring to Dr. Carter's use of bone transplants with periosteum, he had been taught to believe that the periosteum should be removed, because, if allowed to remain, there would be a great deal of increase of bone in the transplant. Bone transplantation of the nose was now done submucously from within the nostrils.

Woody Phlegmon of the Neck (Reclus). Report of Two Cases.

By THOMAS C. WORTHINGTON, M. D.,

BALTIMORE.

Focal infection has an important rôle in the causation of this disease. The prolific bacterial flora of the mouth, throat and nasal cavities, and the rich lymphatic system of the neck, presumably account for the greater frequency of woody phlegmon in this region than elsewhere in the body. The differentiation of woody phlegmon lies between cancer, tuberculosis

and actinomycosis. Its firm and boardlike feel, the sense of resistance of the skin and underlying tissue, the clearly defined edges, the persistent flatness of the greatly thickened mass, its steady encroachment upon the surrounding tissue without much pain, present a picture which is characteristic and which is distinctive of the woody phlegmon of the neck. The treatment is by incision and hot fomentations. Vaccines have been used. The combined treatment has given the best results. Excision is not practicable because of the nature and extent of the tissues involved.

An Answer to Opponents of the Radical Mastoid Operation.

By W. C. BOWERS, M. D.,

NEW YORK.

After a general consideration of the radical mastoid operation, the various objections thereto and the causes of failure, followed by the technic which he recommends, the author gave the following results of 83 actual radical mastoid operations: Deaths, none; complete facial paralysis, none; partial facial paralysis, one. Of these 83 cases, five are at present under treatment. The 78 others have been recently asked to report for examination. Of the 55 who reported, the following particulars were learned:

Discharge		Hearing	
None	42	Better	23
Considerable	4	Much better	10
Occasional	9	Same	19
		Worse	3

From this experience and his study of the published records of many operations, he draws the following conclusions:

1. That many men are performing radical mastoid operations without having acquired reasonable proficiency.
2. That many radical operations are performed when not indicated.
3. That by many operators too little consideration is given to preservation of hearing.

4. That many cavities are not properly cared for either by the surgeon or by the patient.

5. That it is possible to get dry cavities and improved hearing, and that these results are attainable in most cases.

6. That the operation is not dangerous and that complications are seldom unavoidable.

7. That the condition calling for operation is usually a very dangerous one and that it is too frequently dealt with lightly.

Eustachian Irrigation in Certain Mastoid Operations.

BY J. W. JERVEY, M. D.,

GREENVILLE, S. C.

After the operation itself is fully completed, and before the insertion of drainage and suturing, the patient's head is turned face up and a mouth gag inserted. An ordinary eustachian catheter is placed through the nose into the pharyngeal orifice of the tube, preferably under direct inspection with a Holmes pharyngoscope. An assistant holds a sponge, by means of forceps, well up in the oropharynx, to prevent leakage of the irrigation fluid into the lower pharynx. Then with the aid of a rubber bulb syringe and tubing with a tip to fit the catheter, a warm 1/5,000 bichlorid solution (one to two syringefuls) is injected through the eustachian catheter passageway, middle ear, antrum, and on out through the exposed mastoid field. It is necessary that the catheter have the proper curve. It should be introduced well up into the orifice. The catheter should be of small caliber, and the distal inch should be uncurved, with the aperture pointing at an angle of about forty-five degrees from the long axis. By this means the tip can easily be inserted to the isthmus. It may be necessary at times to remove the blood clot from the antrum and middle ear by direct suction or irrigation, before a flow can be established for tubal irrigation.

Tubal irrigation is indicated in every simple mastoid operation where the tympanum and tympanic membrane are intact. For anatomic reasons the procedure is more difficult of accomplishment in children than in adults. However, it is of less urgency in children, as the consideration of time of recovery is usually of less importance economically.

Three cases are reported.

DISCUSSION.

DR. LEE M. HURD, New York, thought it perfectly good surgery to remove adenoids and tonsils in the case of a child at the same time that the mastoid operation was performed. He had never tried eustachian irrigation; instead of using the catheter alone he had used the catheter and then irrigated.

The Value of Ear Examination to the Neurologist.

BY ISAAC H. JONES, M. D.,

PHILADELPHIA.

The internal ear has such an intimate relation with the central nervous system that its study is of especial interest to the neurologist. The ear tests are of particular value in making a differential diagnosis between labyrinth and intracranial lesions and in furnishing additional data in intracranial localization. Nystagmus and vertigo, with loss of equilibrium, associated perhaps with nausea and vomiting, may be produced either by a disturbance of the internal ear or by an intracranial lesion. In many instances the symptoms of internal ear disturbances and of a cerebellar lesion are identical. It is in such a differentiation that the ear tests are often invaluable. A careful neurologic study often indicates a lesion of the cerebellum, whereas the ear examination, by giving additional data to the neurologist, demonstrates conclusively that he is dealing with a lesion of the labyrinth.

A differential lesion between peripheral and central lesions by means of the ear tests depend on certain general principles, which are stated *ad seriatim*. The outline thus given indicates how additional data may be furnished to the neurologist by the ear tests in determining whether he is dealing with a lesion of the internal ear or of the brain stem or cerebellum. In the broader field of localization, examination of the ear and of the vestibular apparatus is also of distinct value. The particular feature of the ear examination is that the aurist sends in a stimulus to the brain centers, and then notes the responses of the different parts of the body to this stimulus.

In order to utilize the knowledge obtained from these tests it is essential to have in mind the various pathways consti-

tuting the vestibular apparatus; and in order to obtain reliable data from an ear examination it is essential that the technic of examination be accurate and painstaking. Since it is peculiarly an ear examination, the otologist is peculiarly fitted to carry out such an examination. One purpose of this paper is to furnish a practical guide for the otologist in undertaking the examination of patients; it is also offered to the neurologist so that he may become familiar with the ear aspects of the work, in order to realize the significance of the reactions as reported to him.

NEW YORK OTOLOGICAL SOCIETY.

Meeting of March 26, 1918.

Fistula Test After Radical Mastoid Operation.

DR. PHILLIPS: This man has had a chronic suppuration of both ears since childhood, with no unusual symptoms beyond the persistent discharge. His right ear has been worse and he has had excessive granulations. This fall it seemed that the tendency to excessive granulation became greater, and, while he did not complain of any pain or any severe symptoms, the discharge continued so profuse that I advised him to undergo the radical mastoid operation on his right side, which was the worst ear. He submitted to this operation and made a very good recovery, but the discharge has continued. However, it is much less in quantity.

About a month ago he began to complain a little of vertigo and he has had a few attacks, but never severe. He had been away on a business trip, and when he came back I employed the fistula test on him and induced very decided nystagmus. The attacks have subsided. He feels perfectly well and he has been able to attend to his business right along, but he certainly shows the fistula test to a very remarkable degree. For this reason I brought him here tonight, because I thought it would be interesting to show the test.

DISCUSSION.

DR. BLODGETT: Why was the right ear chosen?

DR. PHILLIPS: Because it was very much worse than the left—in fact, something happened that is very apt to happen when you operate on the worse ear, viz., the other one will gradually dry up.

DR. EAGLETON: Can he hear with both ears?

DR. PHILLIPS: He does not hear as well with the right ear as before the operation. There is quite a difference.

DR. BLODGETT: In view of the results of this case, if you had another case that was of the same persistence, would you advocate a radical mastoid operation?

DR. PHILLIPS: In this individual case I feel that I have even made a gain, because he would have gone on to the develop-

ment of a fistula anyhow, but I think that fistula is far less dangerous after a very radical mastoid with a large open cavity than it would be in one fully closed with granulations.

DR. BLODGETT: We had a school teacher who in one ear had a radical operation performed, and ended up with absolute deafness. The other ear was an O. M. P. C. We did nothing for it, but she recovered so that she could continue school all right.

DR. PHILLIPS: The only question in my mind is what is the best thing to do with this case as it is today.

DR. BLODGETT: Watch it.

DR. DUEL: May I ask Dr. Phillips, in view of the fact that this man has a fistula, is it not true that the greatest danger he now faces is that of developing an acute labyrinthitis?

I have been mildly objecting to this fistula test, as it is practiced, ever since I first saw it. If this man has a fistula (which he undoubtedly has) he has a granulating surface connected with the membranous labyrinth; is it not possible that an acute labyrinthitis may at any moment be started from this granulating surface by directly invading it?

DR. PHILLIPS: Yes, and walling it off.

DR. DUEL: Now, isn't it dangerous to keep on demonstrating the practical use of this fistula test? You do not know but that the force excited may at any demonstration break through the weakened membranous wall. Once the thing is demonstrated, allowing that it is justifiable once, I think you ought to make a record that the man has a fistula and never repeat the test.

DR. PHILLIPS: I hold the very same views Dr. Duel has in regard to repeating the demonstration.

Now this is a traveling man, and in order that he may be protected I gave him a list of otologists in various parts of the country where he travels. The result has been that almost all of them have tested him out.

I fully agree with Dr. Duel that this man should not be subjected to further operation.

DR. BLODGETT: Dr. Phillips mentioned the fact that the man had one or two attacks of vertigo. Suppose that increased, Dr. Phillips, and you had to pay attention to the vertigo, what would you do then?

DR. PHILLIPS: The idea is, should he develop a labyrinthitis, then operation might be imperative.

DR. HARRIS: The Chair would like to ask Dr. Phillips what the condition of his cochlea is.

DR. PHILLIPS: He has hearing. The hearing isn't quite as good since the operation as it was before. I have tested his hearing. You can all see that he is in good health, and he is attending to his regular business right along.

DR. PAGE: I would like to speak of a similar case in which the fistula test was not demonstrated until after the radical operation had been performed, just as in this case, I believe.

DR. PHILLIPS: This case had no symptoms of any kind. I am trusting to my memory, but I am almost positive that I repeatedly made the fistula test on him before I operated.

DR. PAGE: In the case I referred to, a negative fistula test was found in the routine examination before the operation. A fistula was demonstrated at the time of the operation in the horizontal canal, but it was evidently so protected by cholesteatoma that it did not show beforehand. After the operation the man's hearing was improved—shortly after the operation—and the fistula test was demonstrable.

I saw him a month ago, for the first time in about two years, and his hearing is practically gone. He hears a loud voice with the noise apparatus in the opposite ear, but his hearing is nearly gone, whereas before he had very good hearing. While I didn't put him through the test of equilibrium, he gave no history of any sudden attack of labyrinthitis.

DR. DUEL: He has probably lost his static function as well as his hearing.

DR. PAGE: He probably has, but he had no sudden labyrinthine whirl or loss.

DR. SHARP: Mr. Chairman, I should think that in six months this man's hearing would be entirely destroyed. I don't see how he can have a fistula there in his horizontal canal without eventually destroying the action of the semicircular canals and also destroying the cochlear nerve.

I think we often find, after these radical cases, the patients hear for a while, even better than they did before they were operated upon, but gradually, in a year or eighteen months, they completely lose their hearing.

I should think the patient has a subacute inflammation in his semicircular canal, which will very soon destroy hearing and also equilibrium.

DR. HARRIS: Dr. Sharp's observation is a particularly interesting one, so far as the radical operation is concerned. It would be interesting to know what some of the experiences of the gentlemen have been. A suggested comment on what he says is that very interesting fact of the temporary disappearance of all labyrinthine function and its return. I think we have had a number of those cases reported in this Society, where both the static and cochlear labyrinth were for a time entirely dead; there was, as far as we could make out, no function at all, and later it came back.

It is one of those puzzling things for which I have never heard a satisfactory explanation. It is quite another question, of course, as to what the natural course of events in the labyrinth is, or may be, following the radical operation. Perhaps some of the gentlemen have followed enough of their cases to be able to make some criticism on that point.

DR. DUEL: Mr. Chairman, isn't it perfectly possible for function to be stopped temporarily by a perilabyrinthine inflammation? This happens in very many perilabyrinthine inflammations. There is no way of knowing positively. In one case there may be a perilabyrinthitis followed by extension and complete destruction of function. In others, no extension and only temporary suspension of function.

I do not agree with Dr. Sharp that because this man has a fistula symptom he will lose his function in a year or two. He may not lose it in twenty years. He may occasionally have some evidences of a perilabyrinthitis, some slight dizzy spells; he may have a gradual loss of hearing, but he will not necessarily lose his hearing or his static function unless he develops an endolabyrinthine inflammation.

DR. PHILLIPS: There are just two or three points that seem to me worthy of emphasis. In the first place I see no reason why this man's symptoms should materially change, excepting that I believe the time will come, if he lives and if there are no more serious symptoms that appear, when the fistula test will disappear, on account of the filling in of granulations and the tendency to scar tissue which will form in that area.

I cannot quite agree with Dr. Sharp that the man will gradually become deaf. He may, and he may not. I do not recall many cases where I have seen exactly this same train of symptoms, but I certainly do not recall any cases where they have had these symptoms and necessarily became deaf afterwards—even after some years.

Dr. Eagleton has touched upon an important point, of course, and at this moment I am not prepared to agree with him as to further operative interference.

I may say this man did have cholesteatoma, but the removal of small areas of bone around the fistula, to my mind, might produce some results that would be more dangerous than if let alone.

DR. PAGE: Mr. President, the case that I referred to a little while ago bears out to some extent Dr. Sharp's prognosis, in that while the fistula test was done before and was not observed, at the time of operation a very definite fistula was found in the horizontal semicircular canal. The cholesteatoma was removed from it and a celloidin film was used to protect this point, because a little piece of cotton or sponge touched in this area would cause his eye to move while he was under the anesthetic, and we were all very much interested. I thought his hearing would be disturbed, but it was considerably improved immediately after the operation over what it had been before, owing to the fact that a lot of granulation tissue was cleaned out of the tympanum and that his radical cavity skinned over after two months or so. Then he disappeared and I only saw him a short time ago, and he had the ordinary amount of cerumen and epithelial debris in his cavity, which could be cleaned out. I asked him about his hearing in the ear and he said he could not hear with it; the hearing had gradually left it.

What took place in the labyrinth it is hard to say, but it bore out Dr. Sharp's idea of the question. Still he had had no labyrinthine attack.

DR. PHILLIPS: Mr. Chairman, might I just emphasize one more point that Dr. Eagleton just made? I quite agree with him that the tendency among the leaders in otology in this country today is to do too few radical mastoids. I think in a case of this type with cholesteatoma, and where the discharge

is persistent, with excessive granulation tissue and odor, especially when the discharge is of rather dark brown color, showing that there are particles of necrosed bone that are coming away with that discharge, there can be no argument except the argument in favor of the radical mastoid.

DR. HARRIS: The Chair would like to ask Dr. Page if he feels, from an examination of his patient, that the loss of hearing was primarily from the labyrinth; did he test the labyrinth?

DR. PAGE: I am sorry to say that no test was made. The man came in with acute tonsillitis and I had not looked at his ear, but I asked him about his hearing and, when he said he had no hearing in his ear, I simply stuck a noise apparatus in his other ear and shouted at him, but he barely heard the sound.

DR. HARRIS: Undoubtedly in this case the labyrinth was out of business, or very largely so. But I believe it is true in many postradical operations that the reduction of hearing can be ascribed to the middle ear entirely; to the process that has gone on there, and the conductive apparatus is so seriously reduced.

Improved Rotation Chair.

DR. PHILLIPS: Mr. Chairman, I am very sorry that Dr. Friesner is not here to demonstrate what we believe to be an improved rotation chair. Dr. Friesner and I have been working on this a good part of the winter.

The chief improvements consist of a foot brake that will not get out of order and a chin rest to maintain the correct position of the head during rotation.

DR. HARRIS: We are indebted to Dr. Phillips for bringing this chair over tonight. Certainly the Jones chair, so called, has not met all the demands which have been made upon it this winter.

DR. PHILLIPS: The Hospital Supply Company is making this chair.

Multiple Cortical Hemorrhages of the Brain With Acute Middle Ear Inflammation.

DR. EAGLETON: Mr. President, about a year ago, as some of you may remember, I presented the case of a man who died

seventy-two hours after his first earache, and also presented a brain showing multiple hemorrhages in the whole of its cortex, and I expressed the opinion at that time that it was due to what we called then a streptococcus mucosus; that it was a general infection.

I wish to offer the following contribution with a postmortem. Of course, now we know these cases are pneumococcic infection of type three, which my former case was, and I wish to call attention to the insidiousness of the onset of all these cases, the virulence of the poison, the characteristic changes in the brain that are predicted from my former case—that is, multiple small hemorrhages into the *pia* arachnoid, the presence of the pneumococci in the accessory sinuses of the nose, showing that this is not an ear condition at all; that the pneumococci attack the mucous membrane of other parts of the body, and that in these virulent cases, judging from what we find, surgical intervention is hopeless, and what we must look for is a treatment of the blood condition itself.

The case is as follows: On July 20th, John S., private, had his first earache. When he arrived at the hospital the following day, the 21st, his drum had ruptured and there was a watery discharge. The discharge continued during the 22d and 23d; he was examined by Captain Brooks, who said he might have slight tenderness over the mastoid. He had been feeling comfortable all day, as far as his neighbors knew, on the 24th. However, on the 23d he had had a temperature in the evening of 102, although little attention had been paid to this. On the 24th, four days after the initial earache, his temperature was 101 2/5. The nurse states that on the whole of the 24th he acted rather stupid, as if he felt sleepy, but was easily aroused and talked. At 3:30 without cause he vomited while the nurse was syringing his ears. At 5 o'clock, as the nurse passed by the bed, he said, "I do not think, nurse, I can hold that basin to my ear to be syringed," but when she brought the basin he sat up and held it. Fifteen minutes later, at 5:15, as the nurse passed, he asked her for a drink of water.

I passed the foot of the man's bed, in making the rounds at 4 o'clock, and thought there was nothing the matter with the man except that he had an acute earache. Suddenly at 6

o'clock, while I was in the ward, the man vomited and my assistant ran to his bedside and found the man in a coma; his pupils were widely dilated. I said to my assistant, "This man has had an acute labyrinthitis, he will come out of it in a few minutes"—but he didn't. Following the attack he became slightly conscious, but he could not be aroused. Half an hour later he had a chill. We performed a lumbar puncture. The fluid was cloudy and streaky. Then there was an examination of the eyes. The bacteriologic examination showed pneumococci, and the precipitant test was positive to the third type. This was done in half an hour. I was very much impressed by the laboratory work at the Base Hospital. They came back and said, "You have a pneumococcus meningitis of type three from a precipitant test"—and this was done in half an hour. The blood culture was negligible. He died in deep coma after six hours of the first alarming symptoms.

Now, from these frequent smears and cultures we can say in these virulent cases, I think, from this report and other reports, that these cases really are only incidentally ear cases; that if I had opened the man's mastoid, as we did at the post-mortem, we would have found a wet mastoid, but the same process was in his frontal sinus of the opposite side, through both ethmoids and through the sphenoid, and I am sure if we had operated upon him we would have found what was giving him the infection.

DISCUSSION.

DR. HARRIS: This is certainly a most unusual case which Dr. Eagleton has reported. I doubt if any of us have had a similar experience.

DR. PHILLIPS: I would like to congratulate Dr. Eagleton on the thoroughness of his report of this case. It is a valuable contribution and one, I think, which we will be able to make a good deal of use of.

I would like to know if the Doctor mentioned the examination of the sigmoid sinus, the lateral sinus and the jugular vein; was there any indication of any trouble at all there?

DR. EAGLETON: No.

DR. DUEL: I thought that very likely his infection in the meninges might have been through the aqueductus cochleæ.

I have had four acute labyrinth cases without any apparent gross involvement of the mastoid. Three of them died inside of seventy-two hours; that is, the infection had been so rapid from the middle ear directly into the labyrinth that there had been no time (as fortunately happens in most of our acute labyrinth cases) for this blocked off condition of the aqueductus cochleæ to take place (by a few hours, or a few days) before the endolabyrinth involvement. As I said, three of them died within seventy-two hours, and in the fourth one, some good fortune gave the patient time enough to block off the aqueductus cochleæ before his labyrinth had been invaded. I have seen no case of acute direct invasion recover except that one. They nearly all die very rapidly from meningitis.

I thought this man might have done the same thing: involved his meninges by this direct route through the labyrinth.

DR. EAGLETON: I think so.

Mastoid Abscess Followed by Fatal Issue.

DR. LUTZ: I would like to report a case. I saw a little boy who had had an acute mastoiditis, on the left side, about Thanksgiving time. This subsided in about four or five days and the ear dried out. About a week later I removed his tonsils and adenoids. He recovered from that and had no trouble. Along about the Monday before Christmas he complained of an earache. I went to see him, and it was the same ear that had troubled him before. I opened that ear and he was better the next day—he was very much better the next day. On Thursday he had a cough and some pain in his right side. That was worse on Friday and a pneumonia was made out on that side—he had the temperature, etc., but no chill. Saturday and Sunday he went along about the same. Sunday afternoon he had a marked deafness; his deafness was very markedly increased, and in looking at his ear I noticed it was dull and bulged a little bit. I opened that ear and got a little clear fluid from it. I had looked at this ear three or four times. I took the specimen and left him. Sunday night he became unconscious, and then the question of a mastoid operation came up. We did a lumbar puncture and got absolutely normal fluid. On Monday evening he died at about 7 o'clock. We performed an autopsy on the head that night at about 9 o'clock,

and in taking off the calvarium the dura looked apparently clear, but there seemed to be spots showing through. When the dura was removed, there were distinct patches all over the brain on the upper surface; on the lower surface of the brain there was absolutely nothing. The left mastoid was opened—the one that had been troubling him—and the mastoid cells found full of pus; and then the right mastoid was opened, and that was found full of pus.

The boy had had absolutely no complaint at all from the right ear until the day before; the left ear had given no trouble at all during the interim from Thanksgiving to Christmas, and the left ear healed, the drum closed, and there was no trouble at all. When the question of doing the mastoid came up and we got a clear spinal fluid, we decided to postpone it another day, and then the same day he died.

That was an interesting case to me. The boy had an absolutely normal spinal fluid, nothing out of the way in it at all, and then to find both mastoids had pus in them. The left mastoid showed a streptococcus and a pneumococcus, and the right showed a pneumococcus only.

It was a great trial to me, because I wondered if I should have operated on that boy when he had his first acute ear at Thanksgiving time; still at that time he cleared up within four days' time, he had no tenderness, no temperature, he had absolutely nothing for a month until Christmas time, and then this whole thing happened. I imagine this boy had a labyrinthitis when he became moderately deaf. I think that was the time when he started his meningitis, and it went directly from his labyrinth. Yet, at the same time, when you find a mastoid full of pus, with absolutely no reference to it at all, as we found on the right, it is difficult to decide what to do. I opened the ear on the right side because he became deaf, and I thought it would be wise to open up that ear and, if possible, get a culture from the fluid that was there.

DISCUSSION.

DR. BRAISLIN: Did he get a culture from that?

DR. LUTZ: He got a culture from that—*staphylococcus aureus*.

Did the Chair understand that it was a pneumococcus infection?

DR. LUTZ: Yes.

DR. PAGE: There was a total deafness? •

DR. LUTZ: His deafness was very markedly increased. The day before he was hearing quite normally on the right side, and he became deaf to a very extreme degree.

DR. HARRIS: The Chair would like to ask Dr. Lutz what period elapsed between the relapse and the fatal termination?

DR. LUTZ: Exactly one week.

DR. HARRIS: It is an interesting question whether such a case as that would not have been a very suitable case to have looked for by an X-ray picture?

DR. LUTZ: The boy was sick in bed, and the question of an X-ray plate was suggested, but on account of his chest they did not feel there was any possibility of removing him from the house.

I would like to say that there was absolutely no suggestion or no question of the necessity for a mastoid operation until the chest became very markedly involved, and then there was only a space of one day after that before the boy became unconscious, and the possibility of doing the mastoid was still in the air when he died.

Evasion of Military Service by Pouring Acid in the Ear.

DR. PHILLIPS: At a recent meeting, during the discussion I had occasion to speak of a Russian who had come to the Post-graduate Hospital to inquire if I could do anything for his deafness, and this man, when I questioned him regarding his deafness, volunteered the information that it was caused by an act of his in persuading a doctor in Russia to pour carbolic acid in his ears in order to make him so deaf that he would be excused from military duty; and certainly there was a great destruction of the external canal, especially in the region of the drum, in that case.

Now this last week I had another Russian who consulted me for relief of pain and deafness in one of his ears; and he likewise gave me the information (he was thirty-one years of age) that at twenty-one he went to a physician in Russia, and this physician poured acid into his ear and injured the drum

to an extent so that his hearing became sufficiently defective for him to be excused from military duty.

These cases are of interest just at this time, because they bring to light the possibility of men attempting to do the same thing in connection with our draft; and I am told that there have been one or two arrests of physicians who have undertaken to bring about a physical condition in these subjects that would unfit them for military duty.

Dr. Eagleton is seeing a good many of these men, and I wondered if he had seen any of the results of attempts on the part of any of the soldiers, of the men in the draft, to evade military duty by having some attempt made to render them physically unfit? These two cases both happened to come to me and are rather interesting.

DR.*EAGLETON: I may have seen some of the effects, but they do not tell us about it.

DR. PHILLIPS: I suppose the men have noticed in the papers that a few arrests were made of physicians who attempted to do things of this kind.

DR..LUTZ: A year or two ago I saw a woman who had poured carbolic acid into her ear to stop a toothache and her condition was pretty serious.

DR. PAGE: At the Manhattan Hospital last Monday one case was sent up for examination by the board that had every appearance of being one that had tried to do injury to his own drum. He claimed to have had a discharge from his ear for many years, and on looking into his ear, he had a perfectly good looking drum, no perforation that could be seen; there was an exudate from the surface of the drum membrane, which was red and swollen, and the canal was filled with a sort of a serous fluid. In testing him as a malingerer, he responded as one. I thought there was good indication that he had caused the injury purposely. He claimed total loss of hearing in the ear, and hearing was demonstrated by tests.

NEW YORK OTOLOGICAL SOCIETY.

Meeting of May 14, 1918.

Aural Neuralgia Due to Turbinate Hypertrophy.

DR. F. T. HOPKINS: I had a patient a while ago with excruciating pain in the left ear which caused her great distress, more particularly felt at the time of swallowing, but also frequently present at other times, of a neuralgic character. I had the teeth very carefully X-rayed; there was nothing to show there, but in the nostril on that side the patient had a very large lower turbinate, so that it filled up the whole nasal cavity. After various trials of one thing and another to see if it would stop the neuralgia, for the ear itself seemed perfectly normal, I cauterized the turbinate quite extensively—it extended very far back and was in a very thickened condition—and since then the neuralgia has practically subsided.

I don't know whether it is frequent or not, but I never saw an aural neuralgia due to that condition before.

Brain Stem Lesion Simulating Toxic Labyrinthitis.

DR. I. FRIESNER: I have a neurologic case which was brought to me a week or ten days ago that illustrates again the value of the functional tests in determining the site of the lesion. This young man, a dentist, was thought to be suffering from toxic labyrinthitis. His vertigo and nystagmus began about sixty hours after the ingestion of a meal in a restaurant with a friend who suffered from a gastroenteritis. He himself had no digestive disturbance. The neurologist who examined him found a disturbance of the hearing in one ear with very much diminished reaction to stimulus of the static labyrinth, and thought, at first, he was dealing with a toxic labyrinthitis.

I saw him about two weeks after the beginning of his illness. At that time his hearing was normal. I have the notes of the examination, and, with your permission, will read them.

Rinné both sides positive. Schwabach slightly shortened, both sides. The upper and lower tone limits normal. Tested

with a noise apparatus, both ears could hear low conversation readily. With the exception of the slightly shortened Schwabach, the hearing of both ears was normal.

In the examination of the static labyrinth I found the station good, with very little swaying. There was no spontaneous past pointing in the right arm, but the left arm past pointed two inches to the left. This persisted under repeated tests. There was a spontaneous nystagmus of the rotary type directed to both sides, slightly more marked to the right. There was also a vertical nystagmus upwards. Rotation to the right was followed by a horizontal nystagmus of fair amplitude lasting twelve seconds. Rotation to the left was followed by a nystagmus of very good amplitude lasting twenty-three seconds.

Testing him for vertigo, I found the following: Rotation to the right, the right arm touched; the left arm past pointed one inch to the left. That is to say, on rotation to the right, there was no past pointing of the right arm, and the left arm showed the same spontaneous past pointing that it did before rotation. In other words, as the result of stimulation, we had absolutely no vertigo. Rotation to the left, both arms past pointed two inches to the left. Despite a normal nystagmus, his past pointing was only two inches.

Caloric reaction of the right vertical canals positive, with fair nystagmus in one minute and five seconds; no past pointing either arm. This stimulation caused diplopia.

Caloric reaction of the right external (horizontal) canal slightly more marked than that of the vertical canals. No past pointing either arm.

Caloric stimulation of the right external canal arouses an oblique nystagmus upwards, a phenomenon that I have seen a number of times, and which I have called a transmutation of the nystagmus impulse. I don't know its exact significance, but I have seen it a number of times in diseases of the central nervous system with pressure on the pons.

Caloric reaction of the left vertical canals positive but faint in fifty-seven seconds. Reaction of the external canal more marked. No past pointing either arm.

Conclusions.—The hearing is normal, there is a spontaneous

nystagmus to both sides and also upwards. Functional tests indicate a brain stem lesion.

The neurologist believes this to be a case of botulism. Botulism is an infection from meat, the meat itself being tainted by the bacillus botulinus. I could not believe that such a condition with these organic changes could be toxic, particularly inasmuch as the condition lasted so long. On looking up the literature, the neurologist found that a case that had been reported from a pathologic standpoint showed multiple thrombi in the vessels in the pons and medulla. Such a change could well account for these phenomena.

Of course, this may be a case of multiple sclerosis with an unusual onset, but inasmuch as improvement is so rapid, just a matter of about three weeks now, and the man is almost well, the neurologist inclines to the diagnosis of the toxic condition.

DISCUSSION.

DR. E. B. DENCH: I would like to say that whenever we get a paradoxical reaction from the labyrinth, I mean something that is irregular, we can either put the lesion in the trunk of the nerve or in the central nerve system rather than in the end organ. Moreover, we must remember the labyrinth is a pretty small cavity, and with normal hearing any disturbance in the course of the vestibular branch must affect the vestibular center rather than the peripheral organ itself.

Now, a lot of men have not been drawing their own conclusions but have been writing by the book. Considering the fact that I have been following pretty closely the caloric, the rotation and the galvanic stimulation of the auditory nerve for the last seven years, I know that there are a great many variations which come within the normal standard, as far as time reaction is concerned, and I think everybody who has done any of this work will agree with me, that you can't say that a patient rotated in a certain direction must give nystagmus for a certain number of seconds, and in the other direction for a certain number of seconds. He will give it approximately, but you can't draw the line hard and fast. Where you can draw the line is this: In the first place, if you have a man who persistently overpoints spontaneously, you know he has some-

thing the matter with his brain stem. If you have a man who does not overpoint as the result of stimulation of his vestibular labyrinth, with a normal hearing, he has something the matter in his brain. If he hasn't normal nystagmus as a result of rotation—I mean, with normal hearing always—he has something the matter in the central nervous system. Those are facts that we can lay down pretty closely.

When it comes to the exact location of the lesion, and perhaps I have had as much experience with this as most of the men in this country, because I have been testing these cases regularly for the Neurologic Institute ever since Bárány's tests were made, I think we have a lot to learn yet. I know I have. I think the case of Dr. Friesner is very interesting. I think every point that he has made is absolutely well made.

DR. FRIESNER: I am glad to hear Dr. Dench emphasize something that has been in all of our minds, and that is this: I don't believe that any conclusions can be drawn on a purely time basis with regard to the function of the labyrinth. You must remember that you are dealing with a reflex, at least as far as the nystagmus is concerned. Now, there are many factors that enter into every reflex, simply as it appears on the surface. I don't believe that any neurologist today would put himself on record as stating that as the result of a tap of a certain strength on the quadriceps extensor tendon there must follow a kick of an exact amplitude, and that if this did not occur, therefore that reflex pathway is blocked. And I don't believe that we have any right to attempt to determine the function of the static labyrinth in that way.

There are, however, certain things that we have found with regard to location by having them recur repeatedly in similar conditions. Of course, I agree absolutely with Dr. Dench, and I take the same stand with regard to localization, that there is much that we have to learn. And yet one thing that they have shown us in Philadelphia is this: that where the external canals are active we often find in cases of disease in the central nervous system the vertical canals will not react or will not react normally. That seems to me to be the one most important contribution that they have made to the subject. I never have seen that occur in a case that is perfectly normal, and I have seen it occur in cases in which the neurologist was

doubtful as to whether there was a lesion in the central nervous system, and where eventually other signs of disease in the central nervous system have manifested themselves. There is some value in that. How much localization value there is I do not know, but there surely is some value in it.

DR. E. B. DENCH: I have tried some very interesting experiments in the New York Eye and Ear Infirmary a year and a half ago—that is, instead of letting the patient feel the finger to which he was to point, I had a table made with an isinglass or a celluloid top. In other words, the examiner's finger was put on one side, and the patient located it first with his eye and then tried to point. They will point irregularly every time unless they get the touch. That is a very curious thing, but as long as they do not touch the body, they will never find the location. We have tried that time and again. You will find even a normal individual will overpoint spontaneously a great many times, overpoint one or two inches; when he comes down to the space and actually finds the thing to go to touch he will touch it, but when he comes down to find the point that he wants to touch and touches a plain surface, he won't correct it.

DR. I. FRIESNER: That seems all the more to indicate that the deep sensibility does not play very much part in this thing. If a man will do that without being rotated—that is to say, if he will be influenced not at all by the deep sensibility, so-called, without being rotated, he certainly will not be influenced by it after he has been rotated.

Serous Meningitis.

DR. JOHN MCCOY: I saw a case in consultation with Dr. Robinson, which was rather interesting. This was a woman, thirty-two years of age, who gave a history of chronic suppuration in her left ear for fifteen years. Dr. Robinson saw her at a time that she had an acute exacerbation and operated upon her, performing a radical mastoid. At the time of doing this he exposed the dura in the middle fossa over an area of about three-eighths of an inch. She convalesced very well and left the hospital in two weeks. Two weeks after that she returned to him for dressings, and complained of severe pain through the occiput. Her temperature rose to $102\frac{1}{2}$. He had

her placed in the hospital and had various tests made. He had her spinal fluid taken and it showed an increase of the cells to 230. She had no Kernig, and her Babinski was normal. The blood count made showed that the blood was practically normal.

The chief thing of which she complained was the intense headache, and the pain was so intense that morphin was necessary to relieve her. He watched her for several days, and the temperature ranged between 100 and 102½ degrees.

At the time that I saw her, which was several days after she was in the hospital, she exhibited all these symptoms, and another spinal puncture was made. The spinal fluid which, by the way, on the first was negative as to culture, showed an increase of the cells to 700. The eye grounds were negative, and at the time that I saw her she had a slight rigidity of the neck, the intense headache and a slight Babinski. I made a tentative diagnosis at the time of a serous meningitis. Dr. Robinson took her to the operating room, reexposed the wound and enlarged it. He could find no area of dead bone. He enlarged his dural exposure to the size of a little larger than a quarter. She was returned to bed, and from that time on her symptoms decreased, so that her temperature returned to normal, her cell count some five days later showed 31, and her pain within a week entirely disappeared. She made a very good recovery. So that it seems to me that it was a very clear case of serous meningitis.

Another case was that of a man, sixty-four years of age, who gave the history when I saw him that some five weeks before he had contracted a cold, which was followed by an earache. His eardrum was incised, and, as he said, his ear ran for two weeks and then dried up. During that time he was seen by a general practitioner, and for three weeks subsequent to the cessation of the discharge, and at that time he complained of this dull pain over the side of his head. His temperature was normal. He walked to my office. On looking into his ear, the drum was thickened but not bulging, the mastoid was tender, especially over the tip, and I had an X-ray plate made of his mastoid which showed an abscess in the mastoid with a breaking down of the bony substance. I operated on him the next day and found a very extensive

abscess in the mastoid. The entire inner plate was gone, the dura over the sinus and below the sinus and behind the sinus was covered with granulations, and the external semicircular canal had a fistula in it.

He had given no symptoms whatever of interference with his labyrinth, never the slightest disturbance. As I say, he walked into my office, and so I decided to let his labyrinth alone. The wound was redressed on the third day; his temperature remained normal, about $99\frac{1}{2}$, and at that time he told me that his hearing had improved since the operation—he could hear better. He was dressed again on the fourth day. The wound looked perfectly normal. On the fifth day his temperature shot to 105. He developed rapidly all the signs of meningitis, and on the sixth day he passed out. On the fifth day I took him to the operating room, reopened the entire wound and could find absolutely no pocket, found everything in the wound perfectly healthy looking. I purposely opened his sinus. I thought possibly he might have had a clot in his sinus, but the sinus bled freely from both ends.

The question in my mind was, Did he develop his meningitis through his labyrinth without giving symptoms, or had it passed through the dura and developed a localized meningitis which on the fifth day spread and became general and overwhelmed him?

DISCUSSION.

DR. E. B. DENCH: For the last fifteen years I have been trying to teach men that if they expose a small area of dura they should always expose a large area. In other words, a small area of dura exposed at the time of the mastoid operation or at the time of the radical operation, either intentionally or accidentally, is, to a certain extent, a dangerous accident or a dangerous necessity. An exposure of a very large area of dura is frequently of great advantage to the patient in the radical operation. If a small area of dura is exposed, either accidentally or by design, usually accidentally, in the course of an operation for acute mastoiditis, then the large area must be exposed, for the reason that with a small area exposed you must have a certain amount of traumatism to the dura. I mean when any dura is exposed you must have a certain

amount of traumatism owing to the sponging and the necessary passage of instruments over the exposed dura. Now, you are going to get a certain amount of swelling of dura at that point. If the small area is exposed, the nutrient vessels surrounding the larger veins of the dura are not going to be able to carry away the infection. Consequently, as the result of swelling of the dura and the bone lying close to it, you have a certain amount of stasis of the blood there, and any infectious material there is carried directly through the vessel of the dura to the pia and to the arachnoid, and you get a general meningitis.

Then one other point which that first case of Dr. McCoy's brings out very prominently, and that is this, that in spite of all the experiments which have been made on animals, we are taught that the dura is a perfectly inelastic membrane; that we have absolutely no decompression results from an exposure of a large area of dura, provided the dura itself is not divided. This is absolutely false, as far as clinical facts are concerned, and I have reported a number of cases similar to this one which Dr. McCoy reports. A lot of such cases are reported in literature by independent observers without the particular fact in mind, but we do know clinically that given a case of meningitis—that is, a case with symptoms of meningitis, a stiff neck, a high temperature, a positive Kernig, sometimes a Babinski, sometimes not. The cell count in all these cases is high. I remember one case that was brought into St. Luke's with a cell count of 2,400, and all we did was exactly what Dr. Robinson did in this case after consultation with Dr. McCoy, only instead of exposing an area of dura the size of a quarter, my associate, Dr. Bowers, at my suggestion, exposed an area much larger than that—that is, taking away the entire tympanic roof, doing practically a subtemporal exposure, but not dividing the dura. Subsequently the temperature fell and the cell count gradually diminished and that boy got well. That is not one case, but we have a lot of them.

The point that I would like to emphasize is this: First, whenever you expose a small area of dura, for heaven's sake expose an area not as big as a quarter but an area as big as a half dollar. Of course, this depends upon the age of the patient and a great deal upon the particular conformation of the parts

in the particular case. If you have a big mastoid, expose an area three-quarters of an inch in diameter anyway, and you will find that your accidents, as far as meningitis is concerned, after an operation of this kind, will be absolutely nil. The exposure of a large area does no damage. The exposure of a small area is a pretty dangerous thing.

DR. W. C. PHILLIPS: I would like to know whether the patient had hearing before the operation.

DR. MCCOY: Yes.

DR. PHILLIPS: With the noise apparatus?

DR. MCCOY: Yes.

DR. E. B. DENCH: We are talking in the family now. Two things that I always have done on every case where I am going to do an operation of this kind—I always have a caloric test made before the operation, and I always have a spinal puncture made before the operation, because I know that some of my early cases died of meningitis which they already had before I operated.

DR. PHILLIPS: Do you mean to say that you have a spinal puncture made before every case of radical operation?

DR. DENCH: Yes, I have every case that goes into the ward given a spinal puncture and most of the private cases. I make an exception of some of the private cases, but every case that goes into the ward, as a routine procedure, at St. Luke's, and most of them at the Infirmary, has a spinal puncture made before being put on the table. I know the reaction of that labyrinth before they are put on the table, and it is surprising what you learn by just those two simple things.

DR. T. P. BERENS: I would like to ask Dr. Dench whether in a case of acute simple mastoiditis in a private patient he does a spinal puncture

DR. DENCH: A great many times I do; sometimes I don't.

DR. BERENS: Why don't you?

DR. DENCH: Simply because sometimes the patient objects to it.

DR. BERENS: I started that procedure. I had a series of cases like Dr. McCoy's two or three years ago. I published them, cases of latent meningitis without any symptoms of central nervous involvement at all until immediately before death. None of those cases had a fistula; they were all care-

fully taken care of at the time of the operation; they were all carefully tested. Their hearing was taken, their functional examinations, and their static labyrinths were examined. Still those cases died of meningitis in a very few hours—I don't mean twelve hours, but I mean five or six or seven hours.

One man was over at the park that afternoon, walked there and back, and we found at postmortem great chunks of almost solid pus over and in the brain and cord. Don't you remember I reported those two or three years ago? At that time I started in my clinic an order to use a spinal puncture on every patient.

DR. DENCH: I think the more of those we do the more we learn.

DR. BERENS: It is very interesting to hear you say, Dr. Dench, that you can control your private patients to that extent.

DR. W. C. PHILLIPS: I have never thought it necessary to make all labyrinthine tests in simple mastoids, and I do not do it in all cases of the radical. But in every radical case I make sure whether the patient has hearing in the affected ear. If the patient has hearing and has never given any history of vertigo or nausea or any other symptom that might indicate that there was an involvement of the labyrinth, then I do not always go through the complete test.

Two days ago I operated on a young woman who still had hearing. I mention this more because it emphasizes the one point that Dr. Dench has made. It was a chronic suppuration of five years' standing, with several acute attacks, and an acute attack at the time I operated, and with a high temperature. It was impossible to remove the diseased portion of the tegmen without exposing the dura. It had to be done even in this chronic case, but the acute exacerbation revealed such an enormous area of diseased bone that I could not possibly get rid of the disease without exposing the dura. After a small exposure of the dura, every bit of the tegmen was taken off, and I made a very wide exposure of the dura, as I always do. If any dura is exposed, let it be a large area of dura, in order that drainage may be adequate.

DR. T. P. BERENS: I would just like to add one little thing, and that is in regard to Dr. McCoy's second case. Dr. McCoy

has my greatest and deepest sympathy. I believe he did everything necessary according to the book. These cases will sometimes develop. I have often thought that there may be a localized meningitis that bursts and spreads like that, but I cannot understand how this meningitis can be so extensive as to spread all over the brain and way down into the spinal canal so quickly as to have the patients come in off the street and in two or three hours be dead.

DR. W. C. PHILLIPS: There is one point in Dr. McCoy's second case that it does not seem to me has been mentioned that I believe to him is important. I gather that Dr. McCoy would like to know whether, with a case that gives the history that he had, and he found a fistula of the horizontal semicircular canal, the subsequent history being a death by meningitis, he ought to have performed the labyrinth operation.

DR. DENCH: You should have tested the labyrinth, of course, as well as the hearing.

DR. PHILLIPS: He tested the hearing, and the patient had hearing.

DR. DENCH: That doesn't mean anything.

DR. MCCOY: That is one of the reasons for presenting the case.

DR. DENCH: I understood that the labyrinth was active. Of course, you would naturally test the caloric reaction.

DR. A. B. DUEL: I cannot see how the infection of the meninges in the second case occurred by way of the labyrinth. If this man had hearing it certainly indicated that he did not have a dead labyrinth.

If the infection had extended rapidly through the labyrinth as a result of traumatism or otherwise, he would have lost his hearing before he showed signs of meningitis.

DR. W. C. PHILLIPS: It is quite likely that if he died as the result of meningitis via the labyrinth he lost his hearing before he became unconscious. Now, the question that the Chair would like to raise is this: We know Dr. McCoy's patient had a fistula, and we know he could hear. Supposing in addition to that the caloric test or the rotation test had shown that the static labyrinth was dead and the man had no temperature, would he have been justified in doing a labyrinth operation on that case?

DR. DENCH: No.

DR. PHILLIPS: I don't think so either.

DR. I. FRIESNER: Has anyone ever seen such a case with a totally destroyed static labyrinth and hearing present?

DR. PHILLIPS: I think we had one case.

DR. FRIESNER: Not as the result of suppuration.

DR. J. D. RICHARDS: Unfortunately, I had to go out and I didn't hear what degree of hearing was reported, but to get good hearing in a suppurative labyrinth is a very rare proposition. Now, as to the direction in which the infection spreads and its rate of travel: The most salient point in determining this is to make frequent and repeated tests for hearing in the involved ear. By comparison of these tests we may often gain a very accurate idea of the march of the disease and its rate of travel.

DR. PHILLIPS: I had an experience that beautifully demonstrated the statements that Dr. Richards has made. It was in a patient where an osculectomy was done. That patient, after forty-eight hours, had a chill and vomiting and an attack of vertigo and a rise of temperature to 103 or 104 degrees. Dr. Held saw the patient several hours later. I think this chill occurred in the morning or the night before, and along in the afternoon Dr. Held made a very careful examination of this patient with a noise apparatus, and he had hearing in that ear, but it was very much diminished. He had no nystagmus.

This examination was at 6 o'clock in the evening, and about 9 or 9:30 that same night I saw the patient and tested him with a noise apparatus. His hearing was gone, and he was in a very bad way. He then had a spontaneous nystagmus to the other side, all occurring within a few hours.

That illustrates the point that Dr. Richards has made. With a suppurating labyrinth, which this man no doubt had, he gradually lost the hearing, and there was no question as to the pathway of the infection in that case, because it must have been through the labyrinth.

DR. DENCH: You say the patient was unconscious when you examined him?

DR. PHILLIPS: I said he was rapidly approaching that state. He was slightly somnolent. He was able to give me a positive

demonstration that he couldn't hear at that time, but within twelve or fifteen hours afterwards he died.

DR. J. R. PAGE: In reference to this case—did anyone ever see an invasion pass to the meninges through the labyrinth without a loss of equilibrium or a typical labyrinthine disturbance? As I understand it, it was an acute mastoid, or could be called an acute mastoid with a duration of only three weeks?

DR. MCCOY: It ran for three weeks, stopped and then started again.

DR. E. B. DENCH: Just exactly the point that Dr. Page brought up, and that is that you do not get a fistula in a horizontal canal in five weeks.

We have here brought up the very large subject, I think, of recurrent otitis. A patient will have repeated attacks of acute otitis, not severe enough to give acute mastoid symptoms, or if they do give mastoid symptoms they clear up. It has been the experience of every man who has operated a great deal that you frequently go into a mastoid with a five days' history, so-called, and you find a tremendous lot of destruction. That did not occur in five days. That patient in past years has had mild attacks of middle ear inflammation which have cleared up. He may not have given the history. They forget it. How many patients come into your office with an ear that you find is a chronic ear? They give no history of discharge.

You see a lot of cases coming in with a crust on the posterior wall of the canal covering a perforation. The man says that ear has never discharged. You know that his ear has discharged in childhood. The history that the patient gives in regard to preceding attacks, if they have been mild, does not amount to anything. I think that is exactly what we had here. I think that is a very important point that Dr. Page brought out here, that five weeks do not constitute a history.

DR. T. P. BERENS: I would like to ask Dr. McCoy whether he didn't state that that was an acute middle ear in which the discharge had dried up, and the man had never had any trouble with his ear before, had never had an earache before, had never had a discharge or anything or that sort?

I protest that repeated attacks of earache are remembered by the patients. I remember but one earache I have ever had.

I was seven years old and have never forgotten it. I have seen a fistula of the external semicircular canal in an acute mastoid with a perfectly normal drum membrane, as normal a drum membrane as you could find, with a little bulging in the posterior superior triangle. I saw that patient on the table, and there was a fistula there of the external semicircular canal. Of course, that might have been an anomaly.

DR. A. B. DUEL: Dr. McCoy's records show that the hearing was decidedly improved following the operation, and that twenty-four hours later the patient developed meningitis. There was no evidence of loss of hearing following the operation. If, in that twenty-four hours there had been demonstrated a very marked or complete loss of hearing, the evidence would be overwhelming that the meningeal infection had occurred by way of the labyrinth; but with a large epidural abscess such as he has described there is more probability that the meningitis might have been provoked by some traumatism to the granulations which were the protecting agent for the dura.

The greatest danger that I can imagine is incurred by removal in any way of the protecting granulations over a large epidural abscess. My practice for many years in these cases has been to remove the overlying bone, with the greatest care, to normal appearing dura around the area of granulation, and to interfere with them in no other way other than by careful cleansing with hydrogen peroxid and repeated washing with normal salt solution.

DR. W. C. PHILLIPS: Regarding the question of the rapidity with which a fistula, a breaking down of what we know to be naturally a very dense, hard, bony structure, may occur, I should like to suggest that a fistula would far more easily develop in a case of tuberculosis.

We must remember that there are certain individuals that for various reasons have nonresisting tissues, and I can imagine how a fistula might form in a much shorter period in some of these patients than under ordinary conditions.

DR. DENCH: Might I ask Dr. Duel how many cases of epidural abscess he has seen develop meningitis?

DR. A. B. DUEL: In my earlier years I saw some cases in which the enthusiasm of the operators led them to scrape the

granulations down to the dura. I can't say how many, but I have seen a few cases in which I was perfectly certain that the traumatism to those protecting granulations has caused the death of the patient.

DR. MCCOY: I would like to thank the members for their full and free discussion. It has been a very interesting one. The thing, as I revolved it over in my mind, was, in the first place, the question of whether if I should see a case of that kind again, would I open the labyrinth or would I not, and from the discussion here tonight I am still on the fence.

Here is a man with an acute suppuration of the middle ear. He was a healthy man, sixty-four years of age. I inquired particularly of his past history, as to any other attacks, and he never had had any ear trouble in his life before that. He never had complained of dizziness of any kind. He never gave any symptom to lead me to think that his labyrinth was involved. The thing that occurred to me was that it would perhaps be wise for us to make tests of the labyrinth, in view of this possibly very rare contingency, for us to be able to definitely say that that semicircular canal system was or was not functioning before the operation. Certainly there did not seem to me at the time to be any question as to why I should test his labyrinth. It was an acute suppuration. Of course, the fact that pus lay on the dura there for three weeks without a drain gave me sufficient evidence to believe that his infection had gone through his meninges, that he had established a localized meningitis, which suddenly spread and rapidly produced death.

Pneumococcemia With Ear Involvement.

DR. E. B. DENCH: I haven't very much to report. There is one rather interesting case which occurred to me that came under my observation at St. Luke's several weeks ago.

A young woman, practically two months before she came into the hospital, gave a history of an attack of grip, with an otitis in both ears, more marked on the right side. She had had severe pain, and I think she had had some discharge from the right ear. She came into the hospital with pain in the right ear and a very curious looking canal—that is, she had a typical sinking of the upper and posterior wall of the

canal and a drum membrane that was cloudy and partly concealed by the upper and posterior portion. An incision was made. Very little pus was evacuated. The radiogram was slightly cloudy.

From the appearance of the fundus on the right side and the questionable appearance of the X-ray picture, I opened her right mastoid. The cell walls were some of them broken down. There were granulations in the mastoid, but at the same time there was not the extensive destruction which I am frank to say I rather expected to find. The sinus was exposed during the operation. The sinus was perfectly normal. The dura was exposed in the middle fossa by disease—that is, the softened bone ran down so that I was obliged to expose the dura, and I exposed a large area. The patient did very well, except that she ran a little temperature, but her temperature became normal the third day.

On about the sixth or seventh day after the operation, she developed a very mild acute otitis in the left ear, and coincident to this there was a temperature jump. The ear was incised, the temperature fell and then rose again. The blood culture was negative, and the wound doing perfectly well on the operated side, the second ear draining perfectly well, the **fundus looking as if the ear was going to clear up.**

The temperature remained between 102 and 103½ for four or five days. Then she developed tenderness in the right iliac fossa and her appendix felt sore. They thought she had an **appendicitis** and they took out a normal appendix. Finally, **they got a positive pneumococcus culture from her blood.** At the time of the appendicitis operation the peritoneal cavity had a slight amount of fluid, and the peritoneum was somewhat congested. In other words, here was a case that was suffering from a general pneumococcus infection. She developed a pneumococcus peritonitis, which accounted for the rise in temperature. Possibly the starting point was the ear, but I think probably the development of the ear trouble was entirely secondary to a general pneumococcus infection.

It simply goes to show that if I had been too radical there, I would have taken out her internal jugular vein on the right side, thinking that she had had a sinus.

That girl is entirely well at the present time. It is just a rather interesting case of a general pneumococccemia involving first both ears, then the right mastoid, secondarily the left middle ear, then the peritoneal cavity.

Suspected Sinus Thrombosis.

DR. ROBERT LEWIS reported a case.

DISCUSSION.

DR. DENCH: I saw a case in consultation in a neighboring city a couple of weeks ago in which the child had been operated on for acute mastoiditis on the fifth day after the ear became involved, and the child had a rise in temperature to 105, the wound looking pretty well.

This case followed measles, and I said I did not think that the sinus was involved. The next day the temperature went to 104, any they were very anxious to have something done. I still refused, and the next day the temperature was not quite so high, but they brought the child to New York. The child, as soon as it was under systematic observation, showed that it had a colitis. The colon was washed out, and the child made a perfect recovery.

I think that there are a lot of these cases that are younger men get rather nervous about, and they are inclined to operate too soon. I think that Dr. Lewis' case is particularly interesting because he did refrain from operating—that is, I think that most of you have seen a lot of these cases and practically know when it is a sinus thrombosis. He simply showed his good sense by waiting.

Where you do cure a sinus thrombosis it gets well so quickly that the results are simply astonishing, and moreover, where they go badly, nothing can save them at the end. I think many of the very young men are perhaps too conscientious and they take out their jugular very early. I think in a case of this kind, where you have a moderate rise in temperature and are in doubt, it is very valuable to report the case.

DR. J. D. RICHARDS: I should simply like to mention a phenomenon I have had occasion to observe in three cases of sinus thrombosis. I will simply mention one case which will illustrate the three.

An infected thrombus extended throughout the entire verti-

cal limb, throughout the major portion of the lateral sinus. In dressing the case and packing the torcular end of the sinus the patient complained of exquisite pain in the eye. The interior of the sinus was cocaineized with a 20 per cent solution, and the faintest touch with the cotton application would cause her to raise her hand to her eye and complain of exquisite pain. I have seen that occur in three cases. The face was covered in this particular patient so that she had no idea when I was touching the interior of the sinus, and I thought it might be interesting to mention it simply as a phenomenon.

DR. DENCH: The torcular end?

DR. RICHARDS: Within two inches of the torcular end.

Simple Mastoid Operation Followed by Meningitis.

DR. J. R. PAGE: I wish to report the case of a boy, ten years of age, who had had a mastoid performed on his right ear two years ago. I saw him eight days after an earache started in his left ear, and he then had a temperature of 103 by mouth. I operated on him that night. He had a frank mastoiditis with mastoid filled with fluid pus throughout, and cells that were deep down and behind his facial nerve.

There was no exposure of his nerve, but the day after the operation, at 9 o'clock in the morning, his temperature was 103. However, he felt very much more comfortable. He did not have the headache that he had before. On the third day after his operation he showed a slight paresis of the muscles of the face on the operated side. Two days after this there was complete paralysis of the face on that side. That was about the fifth day. After the second day, he began to complain more of headache. He vomited the first day after his mastoid, but that was due probably to some acidosis, as acetone was found in his urine. After giving him some bicarbonate of soda the acetone disappeared, and he did not vomit any more until the fifth day. Then he vomited twice.

His temperature had not been above 101½, but at 6 o'clock in the morning on the seventh day he had a temperature of 102.6. At 9 o'clock his temperature, I think, was around 103 or 104. He talked to the nurse and said what he wanted to have for breakfast, etc.

I called on him at about 10 o'clock, and he was sitting up

in bed. He had been sitting up in bed ever since the third day after the operation and turning around any way he wanted to. When I entered the room he called to me, and shouted in a very loud voice, "Good morning, doctor; I can't hear anything. I have a terrible noise in my right ear and I can't hear anything." You could easily tell by the sound of his voice that he could not hear his own voice. Yet he was sitting up in bed during this time.

I had Dr. Duel see him that day. We had a lumbar puncture done which showed cloudy fluid but was negative on culture and negative on smear. His leucocytes then were 40,000, 90 per cent polynuclear. He was practically totally deaf. He had had a marked attack of vomiting that morning. He had vomited probably once a day for two or three days prior to that, I think. But he was cheerful and had no evident nystagmus.

On the seventh day, at 6 o'clock in the morning, he vomited; at 7 or 7:30 in the morning he vomited; at 9 o'clock he vomited.

When he greeted me in this way in the morning, I asked the nurse how long he had been deaf, and she replied she had only just noticed it; a short time before, he had heard well.

I dressed his ear, and he remarked that he could hear better with the dressing off his ear. I shouted close to his ear, and he could distinguish one or two words in a very loud voice in the operated ear. With a noise apparatus to that ear he could not hear anything. He could not tell the difference between a loud shout and a loud whistle in the right ear.

He died on the tenth day from meningitis. He was perfectly conscious almost to the very end, up to the day he died. The night before he died he became irrational at times. He complained of severe headache after the seventh day and died on the tenth day.

Now, at the operation the boy had an exposure of dura over his middle fossa, over his attic and antrum, a wide exposure of dura, and also his sinus was exposed. At the dressing on the seventh day the sinus had a grayish appearance, the granulations had not covered his sinus. With that rise of temperature to 104, it occurred to me that he might be getting some absorption through that wall. What I want to be en-

lightened on is: Was this loss of hearing in both ears due to an invasion of his labyrinth without any disturbance of his equilibrium, without any evident nystagmus? The first thing I thought of was a labyrinthitis, because of his roaring tinnitus, his sudden loss of hearing and his pronounced vomiting that occurred on the seventh day. Then, after thinking it over, I remembered that the second day after his operation you could not keep him still. He would sit up in bed and turn his head in various directions. He continued to do that right up almost until the day before he died. He was sitting up in bed when he called to me that he could not hear.

DR. DENCH: Do I understand that he was deaf in both ears?

DR. PAGE: Both ears. My attention was not called to any deafness whatever. It was a simple mastoid operation with fair hearing. I did not test his labyrinth. I operated on him the night I saw him. He had a temperature of 103, terrific headache, pus pouring out of his ear, a marked sagging of his posterior canal wall, a very profuse discharge, a very severe headache—so much so that he was complaining of terrific pain in his head. He was operated on within three hours after he was seen by me. The third day he showed a beginning facial paralysis on the operated side. Now, was the invasion of his meninges along his facial nerve without any labyrinthine disturbance?

DR. RICHARDS: Was the opposite ear a perfectly normal ear?

DR. PAGE: A perfectly normal ear. I had not tested his hearing. You see, this thing occurred suddenly on the seventh day. The first dressing was done on the third day under nitro-oxid, because he was a very frail, sensitive boy. On the fourth day there was a good deal of purulent secretion in the wound, and tube was put in and Dakin's solution instilled every little while. The next day it was discontinued because the purulent secretion had cleared up very promptly.

DR. MCCOY: There was no involvement of the other cranial nerves?

DR. PAGE: No.

DR. DUEL: I have a feeling that the invasion had gone from his meninges to the labyrinth.

DR. DENCH: That is what I think.

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